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Notes of the Month

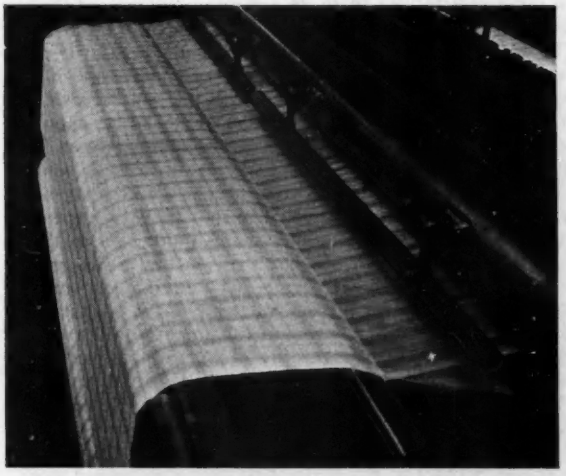
WOOL RESEARCH: PROGRESS AND DEVELOPMENTS

In his report to members at the recent annual meeting of the Wool Industries Research Association, Dr. A. B. D. Cassie, director of research, gave some details of a new development, claimed to be the first new basic principle in weaving woollen and worsted cloth to be introduced since the Middle Ages. This new invention—the WIRA full-width temple—not only maintains the width of the cloth during weaving, but also virtually relieves the warp threads of all the extra strain due to the heating-up of the reed. No other form of temple has achieved this, it is said. The new temple actually holds the cloth firmly across the whole width about ¼ in. behind the place where each new pick is inserted. Pointing out that the new temple is now commercially available and can be easily fitted on conventional looms, Dr. Cassie says: "Analyses of the physics of the weaving process suggested that the amount of beat-up or bump at the cloth fell is associated with the length of cloth between the fell and the take-up roller. This 'bump' exerts a great strain on the yarn and causes many broken ends. The new temple has been designed to hold the cloth across its full width at the fell and so reduce the movement of the fell at beat-up to a minimum. It has been extensively tested with startling results. Not only has the frequency of warp breakages been reduced, but heavy cloths can be woven in looms that would normally be considered too light for them. In addition, the precise control of the cloth over its full width maintains a level line of fell and reduces stitching. It eliminates temple cutting and temple marking and produces better selvedges. The only objection to the full-width temple arises from a short-coming in the loom itself; it is sometimes possible for the shuttle to be trapped between the reed and the fell without the loom 'banging-off.' In this event the reed and warp will be damaged if the full-width temple is being used, but equipment to overcome this drawback is now being developed at Torridon."

Another development on the loom has been showing great promise in the Association's weaving shed and is about to undergo mill trials. This, the WIRA Autocheck, is designed to bring the shuttle to rest more gently at the end of its flight across the loom. This new improvement arises from studies of the method of operation and of the performance of existing motions for stopping the shuttle at the end of its flight. The swell and check on conventional looms call for a great deal of attention from the tuner; they impose very high shock loads on the shuttle and vary in the consistency with which they stop the shuttle in the same place on every pick. Experimental results suggested particular features of the motion that might be improved, and the Autocheck has been developed as a result. Trials at Torridon have been very promising. The consistency of operation is much better than normally obtained and the force applied to the shuttle is only two-thirds to one-half of that normally applied; equally there are no leather parts to stretch and only one adjustment—that for the position in which the shuttle is to be stopped. A unit is now being made for mill trials.

Referring to worsted carding and combing the report states that results of further tests of fibre breakage in mill cards running under production conditions confirm earlier observations that industrial breakage is in the range of 30 - 60%. Investigations into the effect of the variables associated with the card and their effect on fibre breakages are being continued. Tests of fibre breakage at Torridon have indicated that breakage in Noble combing is negligible. Preliminary tests into the effect of reducing the ratio of the surface speeds of drawing-off rollers to those of the circles have shown that some improvement of tear thereby results: the work is being extended to determine the effect of this reduction in draft on such factors as clearance of nep and vegetable matter, fibre sleekness, and increase in combed sliver weight. A study has also been made of the design of comb drawing-off rollers with special reference to leather performance: experimental trials are now in progress.

Another development the industry is showing great interest in is a new electrical device for measuring the length of the fibres in a wool top. The WIRA fibre diagram machine provides valuable information not only on the



The full-width loom temple developed by the Wool Industries Research Association

length of the fibres, but also the proportion of fibres of various lengths—an important consideration in worsted spinning. The graphical record is in a readily recognisable form representing the lengths of all the fibres in a sample as if the fibres themselves were laid out with the long ones at one end graduating down to the short ones at the other end. This new testing machine has only just come into commercial production and demand is still greater than the supply.

The improved WIRA cop grading machine now allows yarn to be automatically sorted at the rate of 1,600 cops an hour. This enables long lengths of woollen yarn, all of the same thickness, to be wound on to one package—a great advantage for the hosiery industry. This machine, by simplifying the selection of suitable single yarns for twisting together, also enables more level two-fold yarns to be produced. It has been giving good service in mills (particularly in the Scottish industry) and now only requires minor modifications to make it suitable for general use in woollen mills.

A new building for wool combing and worsted drawing and spinning has been completed and the machinery is now being installed. The cost of this extension and its equipment, about £150,000, is being met by means of accumulated funds of the Association. Some of the latest types of drawing and spinning machinery, invented since the last war, will be installed in this building, together with other representative standard types.

COMPREHENSIVE SURVEY OF FASHION MARKET

THE average British woman spends just over £19 14s. a year on her outerwear. With this, and the clothes she receives as presents, she gets a suit about once in 2½ years, a skirt a year, and jumper, cardigan or twinset every 5 months, a blouse every 10 months, a dress every 8 months and a coat or jacket every 14 months. She also has 14 or 15 pairs of stockings a year, of which four or five are probably gifts, and spends an average of 7s. a pair on those she buys herself. These are some of the facts revealed by a comprehensive survey of the fashion market carried out by Odhams Press research division over a 12-month period, and the results were recently issued as a report by *Woman*.

The report deals with the clothes-buying habits of all women irrespective of magazine readership and the younger women are the heaviest spenders on clothes. Expenditure on outerwear by the 16 to 24 age-group averages £32 4s. Averages for other age-groups are: £23 6s. (25 to 34), £22 9s. (35 to 44), £17 17s. (45 to 64) and £6 18s. (65 and over). The 16 to 24 year-old acquires an average of 13 outer garments a year, compared with the general average of seven; she also has 26 or 27 pairs of stockings, about a dozen more pairs than the general average. Between the ages of 25 and 44, women's expenditure on clothing would seem to be fairly steady; averages for the 35-44 age-group are only a little below those for the 25-34 age-group. Well-to-do women do not buy many more clothes than those who are less well-off, but they do buy much more expensive clothes. The average upper-middle-class woman buys between nine and ten garments a year at a total cost of £39 8s.; the lower-middle-class woman between eight and nine garments a year for £24 16s., and the working-class woman between seven and eight garments a year for £17 7s. There is, of course, also the class of the very poor who make do with just two (or perhaps three) newly-acquired garments a year, spending an average of £4 1s. on them. Scotswomen (average £21 11s. a year) spend more on outerwear than Englishwomen, of whom those in London and the South-East spend most (£20 7s.) and those in the North-West least (£16 9s.). It is on coats, jackets and raincoats that Scotswomen spend considerably more than the average for the whole of Britain—£7 11s. a year compared with £5 13s. The higher-priced garments in this category account for proportionately more purchases than elsewhere; 47% bought in Scotland, compared with 36% bought in the whole of Britain, cost £8 or more. Purchases of skirts, knitted garments (jumpers, cardigans and twin-sets) and blouses are above average in Scotland; suits and dresses below average.

In London and the South-East, purchases of most types of outerwear are a little above average, and the market for skirts is proportionately larger than anywhere else with expenditure averaging £2 5s. compared with £1 19s. for the whole country. Suits appear to be especially popular in the South-West and Wales where the average woman has a new one almost every two years (instead of every two and a half). Raincoats, too, are in greater demand here than elsewhere, which may account for the region's above-average purchases of coats, jackets and raincoats but below-average expenditure (£5 7s. compared with £5 13s.) on them. In the Midlands purchases of dresses, suits and the knitted garments are above average, with the average expenditure on dresses (£5 13s. compared with £4 17s.) being the highest of any region. The Midland woman also has 16 or 17 pairs of stockings a year—two more than the national average. In the two North of England regions purchases tend to be below average, although in the North-East and North expenditure on suits (£3 8s. compared with £3 1s.) is above average.

At least four-fifths of all outergarments, except knitteds, are bought ready-made. The actual figures are 96% for coats, jackets and raincoats, 89% for blouses, 86% for suits and 80% each for skirts and dresses. Ready-made jumpers, cardigans and twin-sets account for 69% of the total obtained. Only 7% of suits and 3% of skirts and dresses are specially made for their wearers by professional tailors and dressmakers. Of all knitted garments (jumpers, cardigans and twin-sets) obtained in a year, 25% are made by their wearers and 4% by relatives or friends. The proportion obtained ready-made decreases steadily from 78% for the 16-24 age-group to 55% for the over 65s. A greater proportion of clothes are home-made in the Midlands than elsewhere. The 33% of knitted garments, 17% of skirts and 7% of suits, made by Midlands' women for themselves, their relatives or friends, are not exceeded in any other region. Conversely sales of "ready-mades" (especially knitted garments, suits and blouses) are proportionately lowest in the Midlands. The biggest market for "ready-mades," in proportion to the population, would seem to be in the South-West and Wales.

Wool and cotton are the materials from which the majority of outer garments are made. The report shows the proportions of garments made from these and other materials which were obtained during the period of the survey. Wool was the material of which 83% of jumpers, cardigans and twin-sets, 65% of suits, 59% of coats and jackets, 36% of skirts and 19% of dresses were made. The proportion of ready-made to home-made jumpers, cardigans and twin-sets was about two to one, and nearly one-fifth of the suits made from wool were in fact of wool jersey. Cotton accounted for 52% of the blouses obtained during the year, 51% of dresses, 25% of skirts, 9% of coats and jackets, 6% of suits and 4% of jumpers, cardigans and twin-sets. Rayon was used for 11% of blouses, 10% of dresses, 8% of suits and 5% of skirts; silk for 6% of both blouses and dresses.

Industrial Design and Textile Machinery

Organised by the Council of Industrial Design, this extremely successful conference was attended by representatives from most of the firms concerned with textile machinery in all forms. Abstracts from the papers given appear on this and succeeding pages.

Putting Industrial Design Into Practice*

By W. L. MATHER, O.B.E., M.C., T.D., M.A.†

BROADLY speaking, an engineering organisation has to deal with five classes of work:—

(1) It has to deal with the customers' current order, and often customers want a machine with some modification.
(2) It has to modify standard machines to keep them up to date.
(3) Some machines may not lend themselves to modifications, or may have had so many that an overall design change is necessary.
(4) There is always likely to be some fundamentally new design to be worked on.
(5) Customers have ideas of their own for which they want special designs.

All five stages may very well go on the whole time, in parallel. Each puts different demands on the industrial designer but none should be ignored. To go into the matter at all, it is necessary to be quite clear of the objectives: (*a*) appearance which shows an awareness of rising standards in the world; (*b*) greater convenience and comfort for everyone concerned with the product; (*c*) a distinctive style running through all the firm's products.

The emerging nations today lay great stress on novelty and appearance, and care little for tradition and less for old designs, no matter how worthy. Modern appearance and gay colours are part of the new standard of living which they are determined to enjoy, and they reject the Victorian or Communist beliefs that enjoyment should be postponed during the period of acquisition. We British have deep faith in tradition, but the certainty and security which it provides can easily rob us of initiative and adventure.

As a great exporting nation we must be alive to the new standards and, while observing our established traditions of quality and integrity, we must design machines suitable for the emerging countries, with their new and elegant factories. Machines which will ensure clean and healthy working conditions and set a standard of efficiency and beauty that will raise everyone's standard of living. Let us hope that all of us here will enjoy similar standards before long. But living standards and standards of beauty are for most people related to their own environment and upbringing and it is thus difficult for designers, conditioned by our own environment and background, to create the standards of appearance and comfort now demanded overseas, or even to realise their value. Special efforts are therefore necessary.

Britain was the workshop of the world; she set standards others followed, and it was seldom necessary to look far afield for new ideas. Today there is hardly a country not producing ideas of merit or setting new standards and, while we may still be the fountainhead of invention, we must also observe, digest and improve upon the new ideas and rising standards of others. The aspect of design we have neglected most is that of modern appearance and beauty. In fact we sometimes adopt an almost puritanical approach and feel it wicked to produce anything not purely functional. How are we going to enliven this attitude? First, we must obviously give industrial design special importance until we have got it into better perspective. This perspective will not be clearly seen unless we are alive to

L. to r., Mr. J. Rogers, M.P. (Parliamentary Secretary to the Board of Trade), Sir Ernest Goodale (Chairman of the F.B.I. Industrial Arts Committee), and Mr. W. L. Mather (Director of Mather and Platt Ltd.)

* *In a paper at the recent one-day conference organised by the Council of Industrial Design, at the British Rayon Research Association, Heald Green.*

† *Managing Director, Mather and Platt Ltd., Manchester.*

what is happening in the rest of the world and quickly recognise and exploit new trends.

The British textile trade could do more to help the producers of its machinery. Potentially, the user is the most practical designer of all. Textile manufacturers overseas often call in their local machinery makers to examine the latest British machinery, and encourage them to use and improve upon our designs. A good machinery designer must have an intimate knowledge of his home market and, where his business is world-wide, he must travel and learn its problems. He must have an intimate, practical knowledge of the machines he designs, and for this he needs free access to the works where they operate, and encouragement to discuss his problems with the actual users. This is more difficult to do in the British textile trade than in any other of which I have a knowledge. As a result, development work has been easier and cheaper for foreign manufacturers, and they have been able to take a substantial amount of valuable business from this country.

So much for the background of textile machinery design; a need for more emphasis upon aesthetics, a greater knowledge of what is happening overseas, closer co-operation with, and more encouragement from the home users. What about the detail, the actual practice of industrial design? There are three methods of approach. One can develop the practice of industrial design by:—

(1) Training engineering design staff.
(2) Installing an industrial design section in the design team.
(3) Calling upon an outside consultant.

Training

In the past, the draughtsman-designer in ordinary engineering was selected from the shop floor. In course of time he might become a good draughtsman and even a good designer but such a system is now too haphazard. For modern competitive conditions, a designer should have a good education and a fairly broad one. I do not think it is any good at all getting a boy in under the age of about sixteen, and I think seventeen or eighteen is better. Nor at this stage should there be too much stress on technical education, which is a contradiction in any case. Education is education, and while today it may require a greater scientific content than previously, the specialised technical training should follow and be based upon a broad general education as occurs with legal training or medical training. In textile engineering the designer should have a good knowledge of chemistry as well as engineering, and preferably be of Higher Certificate standard.

But how can one foresee whether a boy is going to have an ability to design? It has been my experience that a boy who is naturally artistic is more likely to be a good designer than one who is not. I believe that a boy with artistic ability, selected at the right age and trained accordingly, is almost a sure bet as a designer.

After selecting the boy, the next step is training him. At first he is put into a drawing office for a month or two, or in a draughtsman's training school. He will learn quickly if he is taught properly and has aptitude. If he has, he can remain in the drawing office for a year or so to learn practical drawing, and then go into an engineering works for about two years to learn practical engineering. During all this time he should attend day release and evening classes at the local technical college, studying for technical qualifications. When he returns to the drawing office, he can be put on production work.

It is during this period that he should attend a course in industrial design. Such a course is provided at Salford School of Art in conjunction with the Salford (Peel Park) Technical College. There are various types of courses, both elementary and advanced, short ones and long ones. Coming from our drab industrial back ground, these industrial design courses are an eye-opener to the average student who has been brought up to accept functionalism and ugliness as natural to industry. Consciously to make utilitarian equipment beautiful is a new conception. Once a boy has his eyes opened the results are very gratifying and he becomes an enthusiast for better-looking machines. At the same time, the eye is trained. I believe the eye can be as good a judge of mechanical design as the brain. The trained eye, particularly of a natural artist, is a valuable asset.

This approach can stimulate the type of design mind we need particularly if there is an early integration of industrial design with technical studies.

I consider that all trainee engineers should have some knowledge of industrial design, even if they are not subsequently directly concerned with design, for an understanding of the subject is becoming essential in competitive engineering.

Also, those concerned with detailed technical development will be better able to make use of an industrial design section if they have some background knowledge.

Industrial Design Section

An industrial design section can do three things. It can ensure that everything produced in a company has a common style even though produced by different design teams. It can act as a watchdog to check that ugly or awkward designs are not overlooked, and as a coach for the other designers and draughtsmen, helping them to establish a high standard of appearance and ergonomics. To succeed in this, the industrial design section must have the confidence of all concerned and be brought in at the inception of any project.

This is of tremendous value, for a company's reputation stands upon everything it produces—from the machinery to the catalogues and instruction material which go with it. An industrial design section can create a co-ordinated style which will be recognised as the hallmark of the company's products.

The advantages of getting industrial designers and technicians together at the beginning of a job are manifold. Appearance and ergonomic factors can be weighed against technical requirements. Pictorial impressions of the machine, models, and simple simulated operational layouts can be made so that the inevitable but best compromise can be arrived at. The influence of the industrial designer can very often lead to quite distinct technical improvements, because of the interplay of ideas which takes place at this initial stage in design. Textile machinery is often of a one-off character, or an individual variant on a basic form, to suit a customer's special requirements. An industrial design unit which is immediately available is thus a great help particularly where quick deliveries are involved.

Consultant Designer

This designer should have had a wide experience of dealing with similar problems elsewhere and so can understand the problems of establishing a design policy and evolving the general style which is required. He is the pace-setter of design and should not be expected to tackle a mass of routine design work. Neither can he be really effective if he is called in on one

small problem. He can be especially useful when one main product of a standard nature is to be manufactured. A consultant designer should be called in at the beginning of a project and must be allowed time to get to know something about the problems of the business. This is not always easy—it takes time and thought, and much consultation.

To put industrial design into practice requires strong management backing and an appreciation that specialisation is just as necessary in industrial design as it is in other branches of engineering. Secrecy can be a barrier against development, since we must cross-fertilise our ideas if we are to keep ahead. Aesthetic standards based on our own Industrial background, are not acceptable elsewhere, and while doing what we can to improve that background, we must take active steps to see that it does not debase the design quality of our products. We must be more than ever alive to overseas standards. We must search out potential designers who have artistic merit and see that we have a permanent organisation and training system which will open the eyes of all draughtsmen and designers to aesthetic values. Industrial design sections in firms and the industrial design courses such as are being run at Salford are encouraging developments. The professional industrial design consultant, with his fresh mind, can also provide stimulating help. Let us make our engineering industry famed, not only for sterling worth, but for an elegance and beauty that will enrich all our lives and the lives of all with whom we trade.

The Users Approach to Textile Machinery Design*

By G. WAGGETT, M.SC., A.T.I.†

PROBABLY the biggest difficulty in the approach to this subject is a proper appreciation or even an agreed definition of "good design." It is an omnibus term integrating a large number of separate, interrelated items of design, but the quantitative value of many of these constituent items, especially in the case of consumer goods, depends not so much on technical considerations but on such factors as the intended market, the order of retail price and the required degree of fashion. Even in the case of capital goods, to which textile machinery belongs, the expression "good design" is a function of the background, history and idiosyncrasies of the industry to which is is applied.

The first concern of the textile machinery user is one of cost and earning power. It cannot be emphasised too often nor too strongly that machines are bought for one purpose and one purpose only: to increase, directly or indirectly, the intrinsic value of material passed through or over them. The increase in value is related to such items as the capital cost of the machine (normal and replacement depreciation), running costs (power, repairs and maintenance), labour cost (direct and indirect labour) and size of machine (building cost, lighting and heating).

In a competitive industry the value of these items must be a minimum, while earning power, that is speed, productivity and quality, must be at a maximum. In practice, of course, one cannot always achieve both objectives. Compromises have usually to be sought. The basic principle is to obtain the best value for money. The cheapest can prove to be expensive, the most expensive can prove to be too expensive, while no user will deliberately buy capital machinery loaded with non-productive items.

The machinery user, particularly in the textile trade, will therefore regard the term "good design" in relation to reducing costs or improving output. There is no commercial purpose in changing a machine if the *only* reason for the change is that it has greater eye appeal. The purchase of a machine has to be justified on hard economic grounds. But this justification being first established, the choice of the machine for the job must depend upon a number of factors. "Good design" is involved in all of them but from different aspects which may quite reasonably be given priorities and might be grouped as follows:—

(1) Correct functional action; the capacity of the machine to do efficiently its planned technical job.

(2) Maximum safety to operatives; correct working level; minimum movement and effort by operatives; ease of seeing work; clear definition of controls and their convenience to operatives; ease of carrying out routine settings and speeds; clear identification of service points; ease of cleaning; minimum number of collecting points for dirt and "fly"; ready accessibility of parts to allow easy maintenance; minimum noise; use of central oiling systems wherever possible.

(3) Light pleasant colours wherever possible; good general overall appearance.

With the exception of the first, relative importance of these items varies greatly according to circumstances. The first, however, is the dominant factor in all design. With experimental machinery operating under laboratory or pilot plant conditions, correct function is the only consideration. One hundred and fifty years ago it was the only thing that mattered in those early days of commercial industrial practice. Today, statutory regulations with respect to guarding and cleaning have modified this single demand but the important point is that it is still by far the first requirement of "good design."

To achieve all the objectives listed is clearly not always possible. It is recognised that it is part of the designers' skill to reach a compromise giving the best all-round solution. However, the question arises as to whether inconvenient features are accepted because they have been established for a long time. A questioning outlook is constantly needed from the designer—who should have the ability to see his machinery through the eyes of those who are going to handle it. From the operators' viewpoint, nothing else matters, when controlling the machine, but the working and control areas. If

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* *A paper given at the recent one-day conference organised by the Council of Industrial Design at the British Rayon Research Association, Heald Green.*

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these can be clearly defined by form layout and colour and the rest of the machine withdrawn from his attention, then the designer has, at least, an initial framework within which he can proceed to incorporate the factors listed.

Of these factors a number are now adequately covered by U.K. textile machinery makers. Guarding is now good, and liaison between the makers and the Factory Inspectorate during the design stage of new machinery should guarantee continued good guarding. This is very different from many overseas makers, where guards are either non-existent or only partially complete by U.K. standards. Provision of adequate stop motions has become more accepted, especially as all new machinery is individually motor driven. There has been a minor revolution in the design of the drives for textile machinery over the past ten or twenty years. Forests of belts have slowly been removed reducing hazards, and increasing light and roominess. Although individual drives are less economic than group drives, the general tendency has been to the former.

Recent Developments

Since 1945 U.K. textile machinery has taken on a "new look" based on concentrating gear, use of overall guards, wider use of modern materials, more robust construction and wider use of cut and skew gears to reduce vibration and noise. Gearing design and better arrangement of change points compare more favourably with systems where fantastic contortions were necessary to get a train of gears back into mesh after an alteration.

The use of large smooth covers over areas of machinery not actually used by operatives, has made cleaning much easier, though one has to be careful that "fly" and "dirt" is not held inside these guards.

Noise is a feature which can be solved, though at extra cost, while central oiling systems are becoming more common. Lighter colours have not been adopted, surprisingly, most machinery still being dark blue, grey, black or dark green. While such colours may not show dirt or oil marks, lighter colours on machinery are more suitable for lighter modern backgrounds.

While there have been, on the whole, quite distinct developments in textile machinery, the writer would like to query the relatively slow way in which radical changes are made. Machinery makers are not usually financially concerned with firms using their plant, and guidance on the performance of their machinery flows to them from customers, either by way of complaint or from general discussion. Ideas or suggestions on the modification of orthodox machinery are given to machinery makers by the users, based on actual practical experience and by trial and error on customers' premises, so that progress is made in discrete unconnected stages.

This has led to many more standard items which might not be the best for the industry over a long period of time. The impetus for more radical changes comes from research associations or the larger users. Recent examples include fluid-bed dyeing yarn bulking machinery, the Turbo tow to sliver machine, and non-shuttle looms. There is no doubt that the rayon and synthetic fibre producers have introduced many new ideas into the established textile field. One of the difficulties with new ideas, of course, is that it takes time to develop an idea to the point where it can be used commercially and this costs money. Therefore only the wealthier units can afford to do this sort of work. Before carrying out such a programme, with the knowledge of having to invest a relatively large amount of capital, firms usually want to be fairly certain of ultimate success and the only people to do this are those who will ultimately wish to benefit from it. This is one of the reasons for the making of rayon producing machinery by rayon producers, by the development of tow-to-sliver and tow-to-yarn machinery by the rayon producers, and by their development of high speed knitting frames, and of bulking techniques. These represent some of the biggest technical changes and advances made since 1945. Another reason for much of this development is that many rayon and synthetic fibre producers have financial interests in the trades in which their products are to be used. This allows quicker development to take place between staffs who are experienced in both fields. One is tempted to ask whether the recognised U.K. textile machinery makers might be advised to take a more active part in the industry they serve, or to invite trade technologists and managers into their development discussions. There are many complications and difficulties but there are great benefits to be obtained.

Technological Trends in Relation to Machinery Design*

By V. DUXBURY, B.SC.(TECH.), A.T.I.†

EARLY twentieth century technological trends in textile machinery design in the U.K. could be considered as being directed mainly towards expansion of the cotton industry. Existing machinery was relatively simple, there was a plentiful supply of cheap labour, and the world's markets were open to receive British textiles. What need was there for new-fangled methods! It was easier to stick to known systems and trust the engineers would improve the quality of castings and general workmanship, leading possibly to higher speeds, but certainly to reduced mechanical breakdowns.

New ideas were not in short supply, but the demand for them led to the fragmentation of the textile machinery industry. A high degree of specialisation was soon apparent. Allied to yarn manufacture the card-clothing and the flyer makers appeared as specialists in their own right. In weaving, the temple and dobby makers are two examples of specialists.

To consider further developments I am suggesting there are three main trends:—

Evolutionary Trend—which is the continuation of the type of development just mentioned, i.e., the growing incorporations of specialised auxiliary equipment to a basic process.

Consolidative Trend—which broadly speaking is either the incorporation of a number of processes into a basic unit or the linking of processes by mechanical means.

Originative Trend—which as the name suggests is the origination of entirely new methods.

Each of these entails design aspects that cannot be overlooked if development is to be successful in each trend. Clearly there are a number of factors which will affect the rate of development of each trend.

Evolutionary Trend

This manufacture of specialised auxiliary equipment is tending to increase. The big organisations engaged in textile machinery manufacture generally have large foundries

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* *From a paper at a recent conference organised by the Council of Industrial Design at the British Rayon Research Association, Heald Green, Manchester.*

† *Textile Dept., Manchester College of Science and Technology.*

to keep in production, consequently, the bigger the castings, the better. The manufacturer of "attachments" on the other hand seldom has a foundry and usually buys his components, does a little machining and then assembles them. An example is the drafting systems in yarn manufacture and the pneumatic clearers for gathering broken ends at the ringframe. At a recent exhibition of spinning machinery, the names of the drafting and pneumatic clearer systems were easily discernible, but the determination of the ringframe makers' name required the use of a strong magnifying glass. Similarly, a modern loom is tending to become a vehicle for a component-supplier's healds, another's reed, yet somebody else's dobby, another company's pirn changing mechanism and so on. Thus the basic element, a spinning machine or a loom, is fast becoming a frame on which to append devices whose desirability is dependent upon the success of a component-maker, or the opinion of a machine-user.

While the effect of this evolutionary trend may be to increase speed of production, reduce labour and waste, and improve quality, nevertheless it means that the performance differences between different makers' machines will inevitably decrease. The potential purchaser of new machinery must therefore be faced with a series of machines, identical in their technical performance and differing only in their design features. In some ways the position is similar to that of the manufacturers of automobiles and gas ovens and it devolves upon the textile machinery maker to deal with the problem in a similar manner. Three design aspects become important. The manufacturer has to design his product to look as well as to be efficient. He has to pay more attention to convenient operation and has to have close design liason with his accessory manufacturers.

I am not suggesting that this evolutionary process will go forward on machines which are always entirely identical functionally. For example, in woollen or worsted spinning, the centrifugal system of twist insertion requires design treatment differing from that of conventional cap or ring systems. In weaving, the method of weft insertion has given the designer an opportunity of modifying other features of the basic machine. In the Sulzer loom for instance, the replacement of the traditional shuttle by the gripper-shuttle has enabled the designer to separate the time for beat-up from time for picking. In the air jet and water-jet systems, the warp line is no longer in a horizontal plane, but inclined to simplify the operative's working position. To sum up, the evolutionary trend is one of refinement and addition. To ensure a well-designed complete machine it is necessary, from time to time, to stand back and look at the whole. A more efficient machine from every design aspect may well be the result of such periodic rethinking.

Consolidative Trend

This unifying trend may develop in three forms. One form is the incorporation of additional elements on a basic unit. An example is the "Unifil" weft winding unit on the loom. Winding and stripping of the expended pirn proceeds at the loom but the loom is increased in complexity as a result. Fitting this unit to existing looms gives a technologically efficient arrangement, but the general appearance of the whole leaves much to be desired.

The second form of this trend is concerned with the integration of processes. This offers tremendous scope for the design team, but presents new problems from the standpoint of product quality. An example is sliver-to-yarn spinning in which sliver from the card may be taken directly to the spinning frame, or as in the Tweedales and Smalley system for cotton, from the card to a drawframe and from there to the ringframe. In screen-printing, automatic machines enable continuous operation to replace the traditional intermittent sequences. In all cases, however, elimination of processes reduces the possibility of correcting errors in later operations. Therefore, automatic process-control systems become an essential part of the whole.

The third aspect is the linking of processes by mechanical handling equipment or by a central production control system. Package sizes are increasing and automatic doffing and transportation will be essential simply from humanitarian considerations.

Automatic and continuous cleaning is a further example of this particular trend. The travelling-cleaner system now frequently applied in the ring-room, prevents the accumulation of fly on the frame to the subsequent benefit of yarn quality. This might be extended to other processes, but careful design is needed for application to machines which are less uniform than ringframes in their external dimensions. The central production control is also likely to be an important unifying influence in the designer's hands. By this means, the flow of material and the labour force can be directed at the correct time to the points where it is most urgently required.

In all these cases a greater degree of technological skill is required in machine development and more specialists are required in the design team. Good design is going to come very much more from the ability to integrate special skills. The machinery must inevitably be more complex but its operation should not be complicated in use or in appearance. One particular tendency merits special attention. Control will become more a matter of reading dials and pressing buttons thereby involving inspection and correction rather than direct manipulative operation. Thus while the designer must minimise that appearance of complexity he must also appreciate changes in control technique to suit operators who are "watching" more than "doing."

Originative Trend

In this category, the designer is concerned with brand new ideas and their attendant problems which are frequently unique. The decision by a machinery maker to put a design team to work on a problem of this type requires sound judgement, courage and a progressive outlook.

Generally, this trend is associated with the man-made fibres rather than the traditional natural raw materials. For example the extruded material is usually an orderly arrangement of continuous and reasonably parallel elements, but for various reasons, the continuity is undesirable. The designer in this instance has the opportunity of developing new machines without the influence of the traditional systems. Such systems as tow-to-yarn spinning have been evolved and more recently still, production of textured yarns by a multiplicity of different methods.

In the manufacture of yarns for industrial purposes, tyre-cord in particular, the twister cabler system demonstrates a new machine-design based on the linking-up of two existing processes. This is, however, originative progress since it is only possible by the substitution of man-made fibres for cotton. Another example of this trend is the tufted carpet industry in which traditional methods of pile formation are eschewed and the designer becomes free to organise a system as distinct from an individual machine.

The originative-trend design team is likely to be composed of an even greater number of specialists and will probably include engineers, mathematicians, chemists and physicists. Good design co-ordination will become even more important and requires a specialist who can accomplish this task while ensuring that all other design aspects, control, maintenance and safety are also successfully integrated.

Although I have classified the trends as three apparently self-contained divisions, this is in fact an over-simplification. There is no really clear line of demarcation and there will be a general tendency to promotion from the originative league to the consolidative league and finally to the evolutionary league. An interesting example is the viscose-rayon industry where yarn production by extrusion method and

(*continued on page* 194)

Three of the speakers at the conference. L. to r., Mr. V. Duxbury (Lecturer, Manchester College of Science and Technology), Prof. Misha Black (School of Industrial Design), and Mr. P. Reilly (Director, Council of Industrial Design)

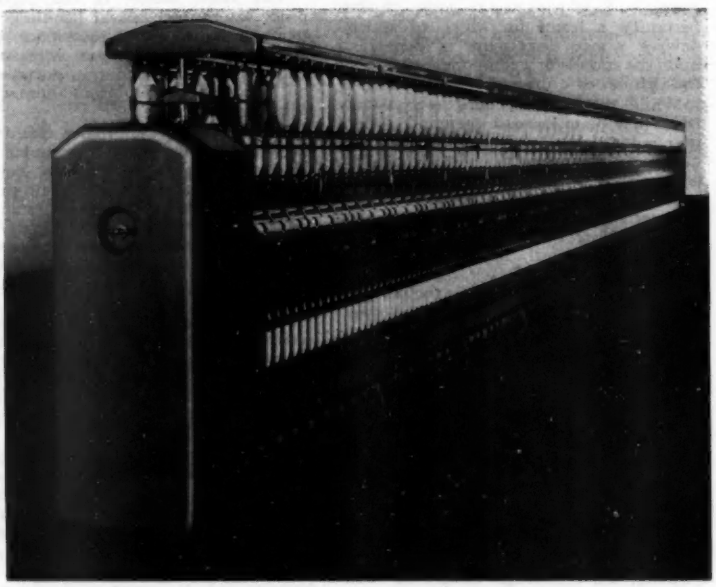
Some Specialities on View at Atlantic City

Brief details of a few British, American and Continental Textile machines

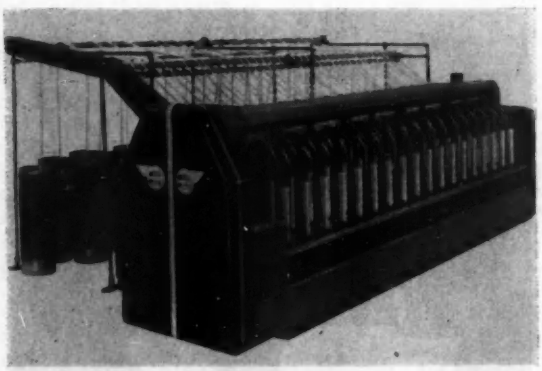
MODERN and efficient in every respect, the MDF.5 drawframe displayed by Platt Bros. (Sales) Ltd., at Atlantic City, U.S.A., features high production, excellent sliver regularity, ease of operation and reduced maintenance. Normally recommended speeds are from 300 - 420 ft./min. The machine is 18-in. gauge and various drafting systems are available, based on three lines of bottom rollers. These have been developed to provide complete flexibility and permit optimum drafting conditions at all passages of drawing for short cottons and up to 2½-in. staple. A pneumatic system of waste removal is incorporated.

The Hartford 8 comber on view is a 8-head machine designed to quality comb at up to 60 lb./hour. Laps of 20 to 40 dwt. may be processed and slivers of 40 to 60 grains per yard produced with either bi-coiling or twin can coiling. It will comb effectively laps made on any of the currently recognised systems of preparation. Operating with equal efficiency at waste extractions from 5 to 25%, it is eminently suitable for all classes of work from super-combing through to upgrading.

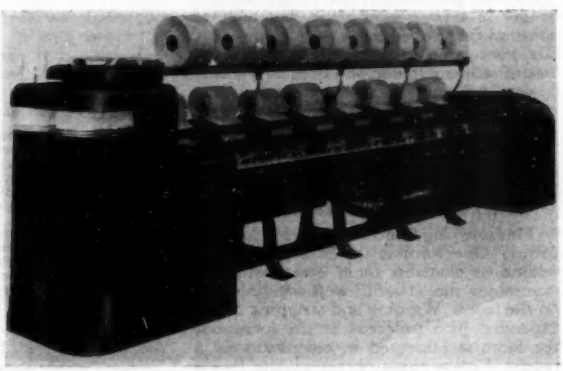
The MS.3 speedframe is a slubber producing 14-in. ×7-in. bobbins containing up to 100 ozs. of roving with high tension winding. Increased spindle speeds—up to 1,200 r.p.m. for this size of package—can be obtained. Latest features include a new gear box for spindle and bobbin drives, front and back stop motions, an automatic flyer positioning device and a novel 3-over-3 drafting system. Developed from mill-proven principles the narrow MR.4 ringframe is an all-count, general purpose, high efficiency machine with considerable inherent flexibility and excellent performance both in production. Roller stand



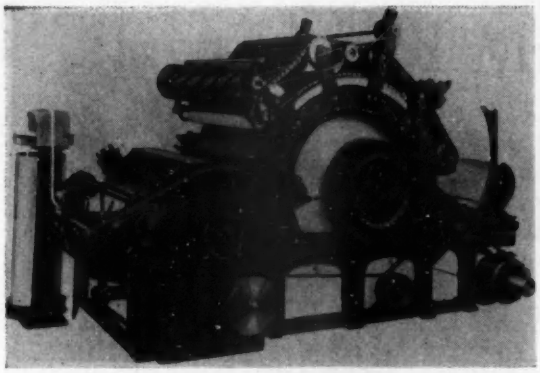
The new MR.4 narrowing spinning frame is an all count, general purpose machine with inherent flexibility



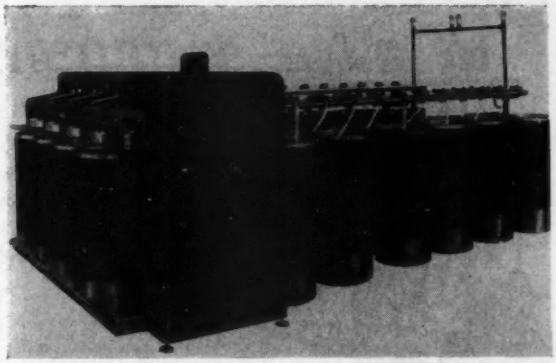
Overall view of the MS.3 slubber producing 14-in. ×7-in. bobbins containing up to 100 ozs. of high tension wound roving



The "Hartford" high production comber is eminently suitable for all classes of work from super-combing to upgrading



A general view of Platt's latest type cotton card equipped with "Crosol" and universal coiler



MDF.5 high speed drawframe occupies a minimum of floor space, is easy to operate, and is said to produce sliver of outstanding regularity

angle is standardised at 45° and improved spinning angles provide more favourable spinning conditions, a lower yarn tension and a better balanced yarn balloon. Various drafting systems can be applied. A new method of ring-rail spring balancing, Platt "anti-wedge" rings and the Spin-SaVac system of broken end collection are standard equipment. Parks-Cramer automatic travelling cleaners, single balloon control rings, S.K.F. double-apron drafting and Meiners thread illuminator are on the machine exhibited.

Platts latest type cotton card, equipped with "Crosroll" web purifier and universal coiler, will interest all concerned with the production of high quality slivers. Easy and accurate settings are long standing features and the "Crosroll" web purifier is designed to pulverise all particles of trash in the web. The universal coiler is available for cans 16 and 18-in. dia., 36 or 42-in. high. The company's tape condenser is a high speed machine with motion shaft speeds of up to 600 r.p.m. The four-height condenser exhibited produces eight half-length bobbins of twelve threads each and incorporates deep grooved dividing rollers, internal surface drum drive, multi-speed drive, traversing creel and centralised lubrication.

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S. A. Metiers Automatiques Picanol, Ypres, Belgium, are showing four models from the "President" range of high speed automatic looms. The CM-R is a 69-in. reedspace machine, designed to run at 185 p.p.m. Equipped with a 20-shaft positive Staubli dobby, it will be weaving upholstery cloths on 12 shafts from 30/2 spun rayon warp and 6s spun rayon weft. Another model—CL-C—86-in. reedspace will be weaving percale sheeting from 32s combed cotton warp and 27s cotton weft at 160 p.p.m. The CC-C, 48-in. reedspace, will be weaving broadcloth from 46s combed cotton warp and 32s cotton weft, on four shafts at 270 p.p.m. The CM-C 46-in. reedspace loom on view will weave Bedford cord on six shafts from cotton warp and weft at 230 p.p.m. "President" looms take standard American accessories such as heald frames, pickers, shuttles, loom leathers, etc. All gears are machine-cut, some of case-hardened steel, and the looms can be fitted as desired with inside tappet-motion, positive or negative dobby, or jacquard. (The U.K. representative is Mr. R. S. Maynard, Langham Court, Fielden Park, Manchester 20).

• • •

Gilbos, Ateliers de Construction, Alost, Belgium, are exhibiting two from their range of specialities. The Type U.C. hank to cone winding machine, suitable for winding 9° 15 ft. hosiery cones for the knitwear industry is equipped with a patent disentanglement stop-motion, a new yarn delivery device, power-driven waxing device, expanding metal swifts, and will operate at speeds from 110 to 525 yds./min. The Type 10 high speed roll winding machine for the production of super-size cross-wound packages 10-in. traverse and 11-in. dia. for the production of very large size cotton, wool, linen, jute, spun-rayon, carpet yarn, and other packages. The winder is designed for winding cylindrical and light conical packages, i.e. cheeses and cones up to 4° 30 ft., at speeds up to 825 yds./min. Fitted with automatic diameter stop motion, vibration suppressors, the winder has specially hardened driving drums, and all other parts in contact with the yarn are also specially hardened. (Sole agent in the U.K. and Eire, Robert S. Maynard.)

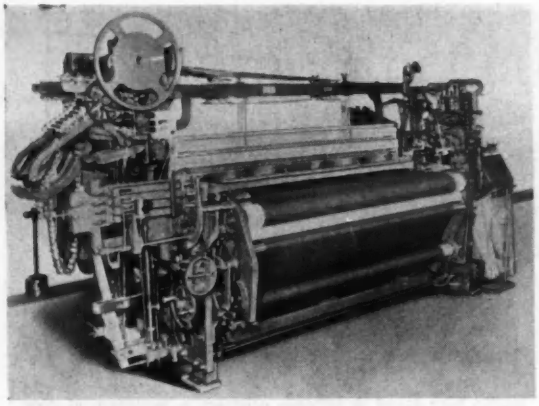
• • •

Ruti Machinery Works Ltd. are showing a very interesting range of preparatory weaving machinery and automatic as well as special looms for all mill requirements. The novel container system—i.e. automatic bobbin loader—will be displayed on two different high speed looms conceived for specific ends:—

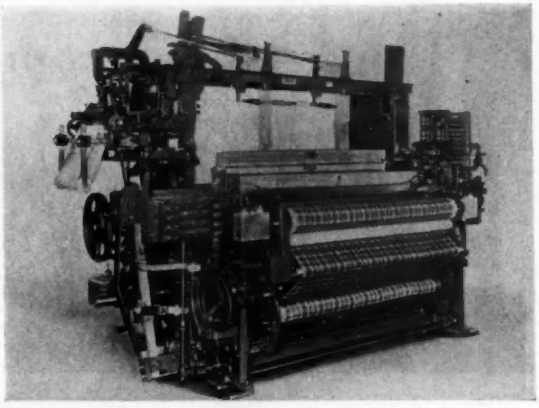
(1) The 4×1 automatic container loom particularly suited for fancy and check fabrics.
(2) The automatic 1×1 box container loom for a wide range of fine and coarse filling.

A third model with the container system fitted, namely, the 1×1 automatic container loom for rayon fabrics is shown in a large-size photographic reproduction. Two further special looms displayed are an automatic high speed loom fitted with the "Unifil" loom winder, and a 4×1 automatic bobbin changer designed specifically for silk and rayon fabrics.

Picanol "President" looms installed in the weaving shed of Union Cotonniere at Bruges



Crompton and Knowles PAPA loom is 72 ins. between swords, 25 harness and 4×3 box



The C. and K. C-7 is designed to achieve considerable economies in weaving terry towels

SEVERAL new features will be on view for the first time on the C-7 looms shown by Crompton and Knowles Corporation. Electric controls on these automated bobbin changing looms simplify the training of weavers and eliminate heavy manual work. There are no shipper handles to pull and no more tugging on the handwheel, since the lay reverses and shed opens automatically after a broken pick.

The C-7 automatic bobbin changing dobby terry towel loom on view is 38-in. between swords, 25 (20) harness, $\frac{1}{2}$-in. gauge—paper indicated, 4 × 1 box—specifically designed for economies in weaving terry towels. This loom can run on fancy towels employing three types of weft. The C-7-S automatic bobbin changing dobby loom, 56-in. between swords, 20 harness, $\frac{15}{32}$-in. gauge—paper indicated, 4 × 1 box, is built to produce fine filament fabrics. It will run on a four-colour weft job utilising a rotary magazine. The pick-and-pick automatic bobbin changing loom (PAPA), 72-in. between swords, 25 harness (Knowles 4/10-in. space head), 4 × 3 box—was built originally to weave automatically fancy pick-and-pick worsted or blended suitings as well as wide swim suit or foundation garment material will also run on pick-and-pick upholstery fabric.

The C. and K. narrow fabric needle loom for tapes and elastic will run elastic web at more than 1,400 sheds/min. on each of the two webs woven simultaneously side by side. A weft stop, an electric warp stop motion with signal light, as well as other features, contribute to excellent work assignments. The C. and K. jacquard on view is a 1304-hook, double-lift, double-cylinder jacquard capable of high-speed operation at low maintenance cost.

* * *

WARNER AND SWASEY's new Servo-Drafter intersecting drawframe on view is designed to produce high quality yarn in fewer operations by maintaining consistent yard-for-yard sliver weight. The new machine retains the proven features and quality standards of previous pin drafter models and provides precise weight control, which according to the company, is accurate within 1%. The machine, in a single draft, can correct input weight variations of as much as ± 25% in wool and the complete range of synthetic fibres. Floor space requirements remain unchanged from previous models. The measuring and control system incorporates a pair of mating mechanical rollers between which each yard of entering stock passes *en route* to the faller bars. Variations in stock weight (thickness) cause variations in roller separation; these variations being transmitted mechanically to a rotating memory wheel.

Around the circumference of the memory wheel, at $\frac{1}{16}$ in. intervals, is a series of 120 movable, precision ground pins automatically positioned to correspond to the pattern of roller separation produced by passage of the entering stock. The memory wheel pins are positioned at one point in the wheel's arc, then read and cleared at another point in the arc, thus providing a time delay. A total of 90 of the closely-spaced pins are in use at all times between the positioning and reading points in the wheel arc, so as to detect even minute variations in sliver weight down to less than 1%. A hydraulic servo translates the pin position variations into faller bar operating speed changes to achieve consistent yard-for-yard sliver weight. Faller bar operating speed averages 1,500 drops/min. (The U.K. agents are Crowther Ltd., Thurmaston, nr. Leicester.)

* * *

A FULLY automatic 6×1 drop box loom (Type 100W) is one of four extremely interesting exhibits by Saurer Ltd., Arbon, Switzerland. This offers new possibilities of weaving with five or six colours in the weft. This new six-colour automatic is based on the "box of bricks" principle, just as the other well-known types of the 100W series. The new construction is composed of the basic machine, the six-colour drop box and the six-colour vertical magazine. The single-shuttle automatic loom on view has a self-acting reloading device (box loader). In the automatic magazine reloading system the apparatus is fed from an attached box containing 120 bobbins. To reload the latter, the bobbin transport box which is provided with a sliding cover, is placed on the supply box. The slider will then be pulled away which opens the way for the bobbins to slip down into the attached bobbin container.

Another feature displayed is a single-shuttle automatic loom Type (100W) combined with "Unifil" loom winder. The combination of simultaneous bobbin winding and weaving eliminates battery filling by hand and only 14 - 17 bobbins per loom are necessary.

A single-shuttle automatic terry loom on view is combined with the electro-

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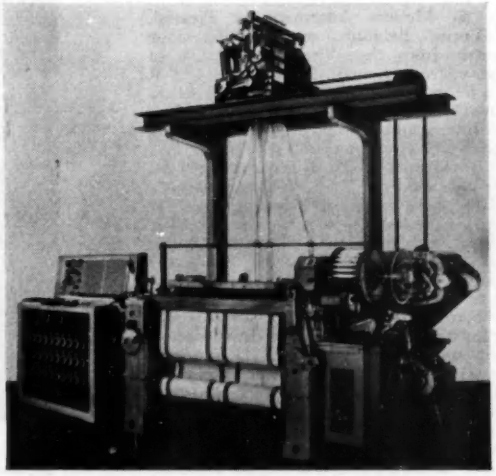


Single-shuttle automatic terry loom combined with the "Huttwil" electromagnetic name weaving control unit

Textile Mill Maintenance—No.5

Description and operation of some of the latest pneumatic and hydraulic equipment now available to industry. Textile applications include powered hand tools, and equipment on warping and beaming machines, roller printers, finishing machines and presses, etc.

By F. H. SLADE, A.M.I.MECH.E.

BEFORE leaving the important subject of maintaining compressed air plant and equipment, attention should be accorded to such items as air cylinders, control valves and pneumatically-powered hand tools. Under practical operating conditions compressed air will always contain a certain amount of moisture which will often have a slight acid content. Thus to avoid corrosion pitting the insides of cylinders, control valves and fittings should be of non-ferrous material. Where steel is unavoidable, the parts should be cadmium plated. For the same reason, design for maintenance dictates the use of copper (and not iron) pipes for the air-line. The latter are liable to produce scale, resulting in the clogging of valves and scoring of cylinders. Regular lubrication of cylinders is also necessary, to conserve the life of the cup washers as well as to ensure free working.

Two types of air cylinders are in general use: single-acting and double-acting. The former relies upon spring action for the piston-return stroke. It is satisfactory for most simple clamping operations, but, where the piston has to overcome resistance to its return, use of a double-acting cylinder is imperative. The mounting details and length of stroke of either of these types is decided by the movements involved. The power output is, however, determined by the bore diameter of the cylinder. The latter feature should be given very careful attention, for in many cases slowness of operation may be due not only to inadequate lubrication but an underpowered cylinder. Should this fault be experienced, it is advisable to check up on cylinder sizes.

An allowance of 20% on the theoretical output on thrust should be made for friction losses and pressure drop on both outward and inward strokes. A further allowance must be made for the piston rod area on the inward or pulling stroke. It is better to overestimate than underestimate. In the former case, a pressure reducing valve can, if necessary, be incorporated in the line to give a reduction in air line pressure with a consequent reduction in cylinder output. This may, in any case, be necessary on the output stroke when equal force on both strokes is desirous.

Inspection of an air cylinder is, in the main, confined to ensuring that the cylinder bore is not scored and that there are no leakages past the piston cups and piston rod seals. All mountings require to be firm and secure and, in the care of trunnion-mounted types, free-moving and of good fit. Design varies with different makes of cylinders, as do also materials of construction.

Control of a double-acting cylinder may be achieved by a double valve, which operates in such a manner that when air is applied to one side of the cylinder the other side is open to atmosphere. With this arrangement it is necessary to ensure that there is no restriction in one side of the circuit, if the piston is to move with equal speed in both directions. Should it not do so, attention is directed to the possibility of there being too sharp a bend on the side of the cylinder showing this fault. Whilst in certain circumstances the use of elbows and banjo connections is to be preferred to a bend, for operational reasons they are best avoided if a well radiused bend can be employed.

When it is desirable that a cylinder should act more slowly in one direction than another, the slower side of the circuit should be restricted by means of an air-flow regulator. Alternatively, by throttling the exhaust air from the cylinders, etc., and thus providing an adjustable back pressure in the cylinder, a constant controlled-speed piston traverse under steady load may be secured. These adjustable features need checking to ensure that their setting has not been tampered with, also to guard against fouling of the ball or needle valve, and wear and air leakage from glands and connections.

Control valves may be of the poppet, slide, or piston type, and each of these in turn may be arranged to be operated by hand, foot lever, solenoid, pneumatically or mechanically, i.e. by a cam or similar device. Generally, to effect a timed sequence of operations, a circuit will include a series of prime movers (i.e. air or slave cylinder); this type of circuit, after the air inlet manifold, can include such items as the master control valve (to initiate the sequence of operations), remote control valves, trip valves (actuated by the operative mechanism), timing cylinders, air-flow regulators or throttle valves, etc. It must be constantly stressed that dirt, corrosion and air leakage act adversely on the timed operation of the pneumatic equipment and, in consequence, the machinery or plant to which it is applied.

Adequate lubrication of moving parts should be carried out at scheduled intervals, exhaust ports kept clear of anything likely to restrict air flow, proper adjustment maintained, springs renewed immediately on showing signs of fatigue and all components indicating signs of wear renovated or renewed. Badly seated and leaky control valves can also be a source of trouble. Here it is to be understood that valves of the slide-valve type rely upon truly flat surfaces for their proper functioning. Noticeable leakage from the exhaust port when the valve is in the "off" position may be due to dirt between the valve faces preventing contact, or that the faces need relapping. It is important that both valve face and slide be lapped independently. The two parts should never be lapped together.

Piston-type valves of some makes are sealed by "O" rings which are easily replaceable. With reasonable

treatment these seals last a long time, but when it is eventually necessary to renew them it is important that they are not twisted or damaged when they are being fitted. It is also advised that the member is lubricated well before fitting and under no circumstances should a degreasing fluid be used for cleaning purposes.

Provided that a circuit is supplied with clean, dry air at the correct operating pressure and that it is properly designed, installed and maintained, proper functioning throughout may be expected. Should the required movements obtained not be as precise as those required, it is advisable to change over to solenoid-operated control valves, energised by microswitches. Owing to the fine setting obtainable by this type of switch, valve reversals within a few thousandths of an inch of linear travel of the striking member is made possible. With small valves, operation is effected by the direct pull of the solenoid armature; but in the case of valves of larger capacity, the solenoid unit should only be used for servo control.

Not only is resort had to electro-pneumatics under certain conditions of operation, such as that quoted, but also to hydro-pneumatics. It may be found that pneumatics applied to slow feeding arrangements result in a series of slow, jerky movements when the air is throttled down to give the required speed. This is due to the inherent compressibility of air. The jerky movement caused by pressure build-up when resistance is encountered may, however, be eliminated by preloading the air cylinder by incorporating an oil dash-pot in the circuit.

Powered Hand Tools

Many pneumatic equipments will continue to do work even when worn or in need of maintenance; at the cost of increased air consumption and lowered output. To prevent such an occurrrence it is good practice to prepare a rota for the examination of every pneumatic appliance in a plant.

The ideal arrangement would be to make a list in which the air consumption figure given by the manufacturer is filled in against each appliance. This target figure could then be compared with the actual consumption of the appliance as observed by a portable air meter. Rising air consumption will indicate the need for attention by the maintenance workshop.

For maximum output it is also necessary to ensure that the supply of air is adequate and that the proper pressure is supplied to the tool. The air pressure available may be determined by means of an air gauge with a hypodermic needle attached. The needle is inserted in the tube and a reading taken, the hole so made being self-sealing on withdrawal of the needle. Inadequate pressure will call for corrective treatment. If, however, the pressure at the tool is normal, but the power developed by the tool is below normal, the tool should be withdrawn from service for further examination.

Where portable hand tools are involved, it is advisable to train all operatives in their proper usage and in the detection of minor faults or irregularities arising in their use. Proper facilities should be provided for inspection, test, repair and overhaul of tools. They should also be cleaned, lubricated and protected in a suitable manner for storage during periods of disuse, in order to guard against deterioration from internal corrosion and external damage.

Careful handling is at all times important, and operatives should be trained to avoid kinking air hoses. The dropping of tools on to the work floor or metallic surfaces on completion of a job, also the dragging of a tool along the floor by its connecting hose, has often been responsible for damaged hose couplings, bent or broken tool handles, cracked valves and bent or fractured trigger levers.

Air should be permitted to flow through the hose before connection to the pneumatic tool, to ensure freedom from moisture and other impurities, which would otherwise be forced into the machine. It is also worthwhile to inject a small quantity of oil into the internal chambers of the tool before fitting the hose. A good seal then should be made on the coupled joint to prevent any possibility of air leakage, and the tool run idle for a short period to ascertain that there is no vibration, overheating, lack of operating speed, or air leakage.

Air strainer valves should be checked at least once a day for cleanliness, as should also the air outlet ports, before the tool is operated. Other operational features to be observed refer to the employment of proper accessories. After the completion of a day's work, or of an individual operation if the tool is not on continuous work, it is essential that it should be properly cleaned. This involves external cleaning and wiping over the body with a film of oil. The hose should be disconnected and all accumulated condensate drained from the internal chamber.

One of the main causes of wear in pneumatic tools, with its resulting loss of power, is lack of lubrication. Most portable tools have oil reservoirs. These should be filled once or twice daily, with a light oil, as recommended by the manufacturers. Tools that do not have an oil reservoir are usually serviced by a lubricator on the air line. It is recommended that all grease reservoirs be replenished once every two or three days. Adequate and regular lubrication also increases the life of the blades or vanes of rotary type tools. When these parts become thin or badly worn they should, of course, be replaced promptly.

Every tool in constant production use should be withdrawn from service once every month for inspection purposes. This will include stripping down and the examination of the internal mechanism. The regular cleaning of air passages in flexible hose, coupling joints, nipples and connections is also important, in order to prevent restrictions that might well result in lowered air pressure and, in consequence, power losses.

Other places where dirt accumulations have a deletrious effect are the inlet and outlet ports. These usually require cleaning and occasionally it is necessary to drill the dirt out of the holes in these ports. Here care must be exercised to use the proper drill size to avoid enlarging the holes. Parts subject to the heaviest strain during operation should next be carefully inspected. These will include such items as starting triggers, valves, handle fixings and sleeves, coupling joints and spindle end-thrust devices.

With rotary tools, the main spindle and adjacent shafts, also any reduction gears, should operate with a minimum of end float. This is necessary to reduce lateral pressures on bearings and in so doing give longer working life to both spindles and bearing. Well maintained and properly fitting bearings are, in fact, most important. The mountings should be kept clean and well lubricated, but not over-lubricated; where such provisions exist, adjustments should be made whenever necessary to counteract wear and slackness. It is also advisable to replace a bearing immediately, whenever it shows signs of appreciable wear.

Many of the foregoing features apply equally to tools of the percussion type. Apart from these, a feature calling for the greatest attention is the maintenance of the reciprocating piston

smooth and square with the barrel, to avoid injury to working surfaces and the tool shanks. The piston should also slide smoothly within the barrel and be properly adjusted after reconditioning to ensure easy engagement with standard lengths of tool shanks.

There is no doubt that pneumatically powered hand-tools are of inestimatable value to not only production, but also to the maintenance section. For example, the wall fixing of components, piping or electrical conductors can prove a time-absorbing task if resort is had to manual methods. Fortunately, the slowest part of the work, the drilling of the plug hole, can now be done by pneumatic hand-tools. One of the former, an Atlas Copco "Wasp" plug-hole drill is illustrated in Fig. 29. It is a recent introduction, weighs 6·6 lbs. only, and offers something radically new in compressed air tool design.

The apparatus has a two-step throttle. On initial pressure the machine starts at reduced speed for accurate control when starting the hole; full pressure on the throttle lever gives maximum drilling speed. Dual throttle levers permit either right- or left-hand operation. Right-hand rotation is automatic and the mechanism, similar to that of rock drills, consists of a ratchet wheel, and four ratchets. The conventional ratchet springs, however, have been replaced by cylindrical cushions in a non-wearing plastic material. An air-flushing feature keeps the hole clear of dust and chippings, prevents clogging, and thus results in faster and more efficient drilling.

Fig. 29. The drilling of plug holes for fixing piping, electric conductors, etc., to masonry is facilitated by the Atlas Copco "Wasp" drill

Hydraulic Equipment

Hydro-pneumatics, as already observed, offer a medium whereby air cylinders may be preloaded so as to eliminate erratic movement in slow-feeding arrangements or during cutting strokes. Modern practice is to combine two cylinders, mounted in tandem on a common centre casting, to form a hydro-pneumatic unit. The rear cylinder is air actuated over the full working bore while the front cylinder comprises the oil dash-pot, controlled by flow regulators located in the oil pipelines. The oil cylinder head can also be equipped with an integral plate valve to facilitate rapid reversal, by permitting oil to flow fully through the piston in one direction only. The unit can be incorporated in any of the automatic cycles using standard valve-gear arrangements because the prime mover is again an air cylinder. The hydraulic cylinder applies preloading, the magnitude of which is determined by the oil flow regulators.

The foregoing application does, as will be seen, provide a border line between applied pneumatics and hydraulics. Hydraulic controls and transmissions have been developed during recent years in spite of the improvements made in electrical transmissions, and the introduction of electrical drives. Advantages claimed for their application are steplessly variable speed control between zero and maximum, with light, easily-operated controls; full protection is given against overload without damage to a machine; operation is quiet and reversal of high-speed parts can be accomplished without shock; lubrication of moving parts is ensured since oil is used as the working fluid.

It should be firstly understood that there are two definite types of hydraulic power transmission; the hydrodynamic or hydrokinetic and the hydrostatic. Hydraulic couplings and torque converters fall within the former group and positive displacement machinery within the latter. Scoop control couplings have wide industrial applications, in many types of drives in powers ranging up to several thousand horse-power in a single unit. The ability to provide steplessly variable speed is one of the reasons why this type of equipment is so extensively employed. Representative applications are to the drive of reciprocating pumps and compressors, crane-bridge and cross-travel motions, belt conveyors, centrifugal fans and pumps, etc., thus covering the load classifications of (1) pure constant torque load with considerable rolling inertia, (2) constant torque load with low momentum or loads subject to torque fluctuations due to friction changes, and (3) winding and coiling drives, and other acceleration drives.

Hydraulic couplings of this type provide inherently low-maintenance drives subject to virtually no attention after they have been correctly installed and fitted. All parts run with good clearances, while the oil ensures good lubrication. One of the most important features applying to installation and equally to reinstallation should the drive be dismantled for any cause or relocated, is that of alignment of the motor and fluid drive to the driven machine. It is common practice to have the motor and manifold supported by a rigid sub-base so that the drive becomes a unit. Separate supports from a concrete or steel substructure are also suitable, provided that the motor support and manifold support are rigidly tied together and that there are sole plates for accurate shimming.

In general, the applications of hydrostatic types of power transmissions fall within the two categories of (*a*) applications where accuracy of speed control and quick response are of paramount importance and where this type of power transmission offers advantages that make it the obvious choice, and (*b*) a large range of applications wherein the same sensitivity of control is not required and other forms of transmissions could give acceptable results. For example, in this latter group purely mechanical transmissions, electric variable gears, or hydrokinetic transmissions are selected after consideration of such factors as cost, efficiency and weight.

Most of the industrial oil-hydraulic equipment of the hydrostatic type in use today provides for variable-pressure working either in part or in whole. Where possible, it is desirable at all times to generate only sufficient pressure to overcome the resistance. Where constant-capacity machines are used and the reduction in speed is obtained by "spilling" part of the flow, this desired condition can be obtained by throttling the flow which is being spilled (instead of throttling the flow to the appliance). This arrangement gives a sufficiently sensitive control for many applications. Where more accurate speed regulation is required, a flow-control valve is incorporated in

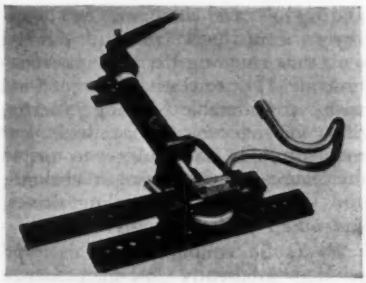


Fig. 30. The Mingri pipe bending machine exemplifies the value of hydraulic power as a labour aid. It produces smooth bends in pipes from ¾ in. to 4 ins. nominal bore

the main circuit to adjust the spill automatically.

In variable-pressure constant-flow systems, the spilling of pressure liquid results in power loss but in many cases the amount of such loss would be trivial. Where the loss would be substantial, it can be minimised by using multi-capacity pumps or appliances; alternatively, it can be avoided altogether by using pumps of steplessly-variable capacity. Pumps of the Hele-Shaw type are typical of variable-speed piston pumps, as are also the Thoma type. Other oil pumps include rotary, vane, moving-abutment and screw types; all of which may be smaller than piston-type pumps, with smaller internal bearing loads.

Naturally, a rotary motor is required to provide continuous rotation. This type may also be used with screws or gearing, to obtain reciprocating or angular movement with a degree of internal friction sufficient to damp out parasitic vibrations or, when required, to provide complete irreversibility. Reciprocating motion is, however, usually obtained through the use of hydraulic transmissions consisting of a pump, appropriate valve gear for control and a ram, or hydraulic cylinder.

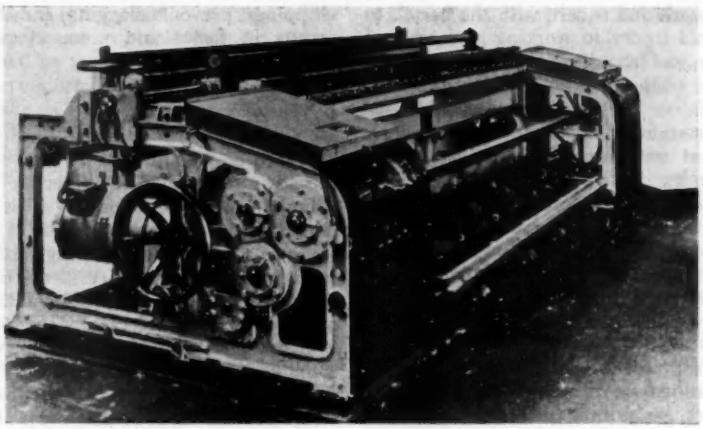


Fig. 32. This three-yard wide beaming machine is designed to give constant beaming speed at a constant hydraulic linear pressure, and cut out at some constant pre-set yardage

The simplest form of hydraulic system comprises a hand-operated pump of either the lever or screw type, capable of delivering fluid at a high pressure to one or a number of slave cylinders. Devices of this design can be used to facilitate many maintenance jobs. A typical unit is illustrated in Fig. 30. Designed as a labour aid, the Mingori pipe bending machine is made in four sizes which, when fitted with pressure formers of the requisite size, are capable of producing bends in pipes of ¾ in. to 2 ins., ⅞ in. to 2½ ins., 1½ ins. to 3 ins. and 2½ ins. to 4 ins. nominal bore. The minimum range of the various formers is from 1 $\frac{13}{16}$ ins. to 41 $\frac{23}{32}$ ins. In addition there are several attachments available—for bending gas and steam pipes up to 180 and for bending, to small radii, light gauge steel, alloy and copper piping.

Amongst the many functions of hydraulics in the design of textile machinery is that of loading, exemplified by the Mather and Platt 8-colour printing machine shown in Fig. 31. Here many advantages are claimed over lever and weight loading. Pressure on each side of individual printing rollers can be adjusted separately from the control panel, the load applied being indicated by gauges; so enabling operating conditions to be repeated accurately from day to day.

A constant-pressure valve ensures that only the pre-selected load, up to 6 tons for each printing roller, is

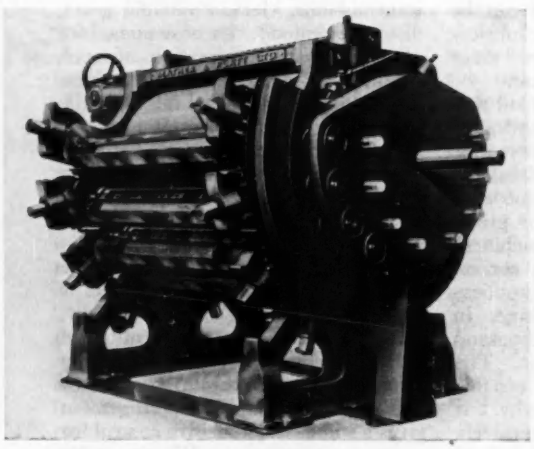


Fig. 31. Hydraulic loading is incorporated in the design of this Mather and Platt 8-colour printing machine; ensuring constant operating conditions

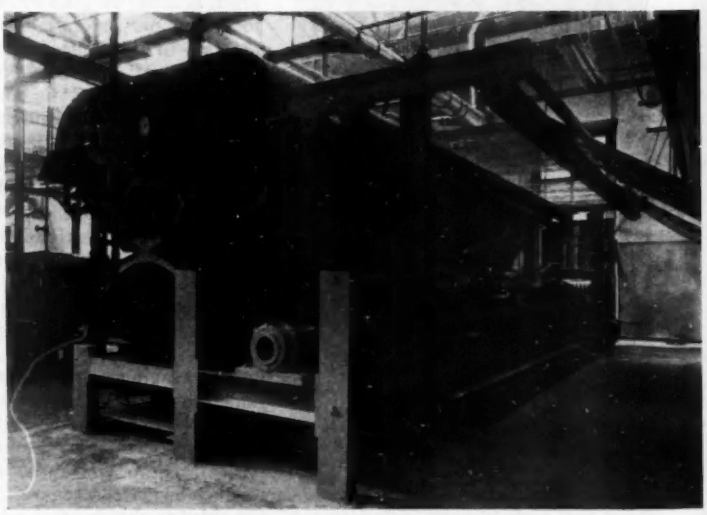


Fig. 33. The beam in the warp sizing beam head weighs over 1½ tons when filled with jute yarn

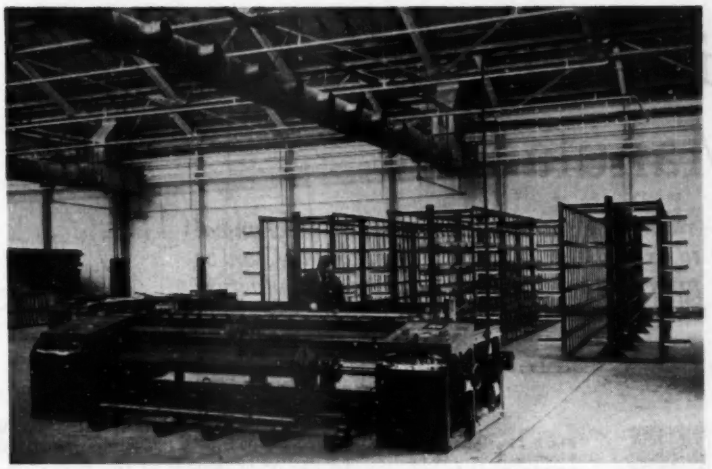


Fig. 34. Incorporating many advanced design features this 4-yard hydraulic beamer is equipped with an electric stop-motion and a magazine type balloon creel

applied. Stitchings are thus not subjected to shock loadings. Elimination of the latter operational fault, together with the resilience of the pressure applied, also provides for a considerably increased working life of the lappings on the central bowl. Screws for setting are obsoleted by the embodied hydraulic features and a duo-circuit control at the panel ensures that the engraved rollers are brought evenly to the printing bowl in 2 to 3 seconds. Withdrawal can be effected as quickly and as easily.

Boucher and Co. Ltd. are responsible for the equipments illustrated in Figs. 32, 33 and 34. The former of these, a three-yard wide hydraulic beaming machine, is arranged to give constant bearing speed at a constant hydraulic pressure and to cut-out at some constant pre-set yardage. By the aid of the hydraulics, an empty beam can be lifted into position without the use of external lifting gear and the same loading arm can lower the beam out when it is filled. The beam incorporated in the warp sizing beaming head shown in Fig. 33 weighs, when filled with jute, over 1½ tons. It is claimed that this machine is capable of producing the most accurate beam, an important feature where carpet manufacture is concerned. It is further claimed that the 4-yd. hydraulic beamer, illustrated in Fig. 34, with its electric stop motion and magazine type of balloon creel, is one of the most up-to-date machines on the market today.

The foregoing machines are specially designed for the production of cotton, jute or woollen yarn beams. Constant peripheral beaming speed is provided; the ratio being 6:1, giving constant draw from a creel on to a beam from a 6-in. diameter barrel to 36-in. diameter flange. Constant pressure at the press roller is obtained by the adjustment of a hydraulic valve on the facia panel, which can be varied from 0 - 1,000 lbs. per sq. in. Recommended pressures for beams with up to ⅜ in. thick flanges are 500 lbs./in.² for woollen yarn, 600 lbs./in.² for cotton yarn, and 700 lbs./in.² for jute yarn. The hydraulic loading and unloading of beams is simply accomplished by moving cages over the press roller, and either raising or lowering the hydraulically-operated arms enabling empty beams to be lifted in and full beams out, as required.

Continuous automatic finishing presses of the type illustrated in Fig. 35 are being increasingly used for woollen and worsted fabrics, and more particularly for rayon and mixture fabrics. They combine intermittent pressing with a continuous process which is very simple and inexpensive to operate. Standard machines are produced by Henry Berry and Co. Ltd., in three sizes having maximum pressing powers of 350 tons, 600 tons, and 900 tons, respectively, and various numbers of platens providing up to a maximum of six daylights. The platens, which are the vital part of the machine, are made from steel forgings, precision ground, with steamways arranged so that a correct serpentine steam passage is obtained giving uniform temperature over the whole platen area. Again, a choice of platen sizes are available dependent upon width of fabric to be finished and pressing power. Steel manifolds and pipes fitted with special joints form the steam inlet and outlet connections to the platens. The fabric is drawn from the outgoing reels and passes through the press daylights three or five times before automatic reeling carries the fabric to the outgoing reels at the opposite side of the press. Press papers are arranged between each layer of cloth. The average continuous production obtainable may be up to 1,260 yds./hr.

Hydraulic pressure is provided by means of a self-continued hydraulic pump and pressing operations are controlled by a fully automatic valve. The sequence of operations controlled by this automatic valve comprise: closing of platens; building up of pressure; dwell on pressure for a pre-determined period; and opening of platens followed by automatic draw through of the fabric in readiness for the next cycle. The complete cycle of operations is repeated approximately 3½ times/min. The drawing gear is entirely separate from the press, thus eliminating any vibration from the press being transferred to the drawing gear.

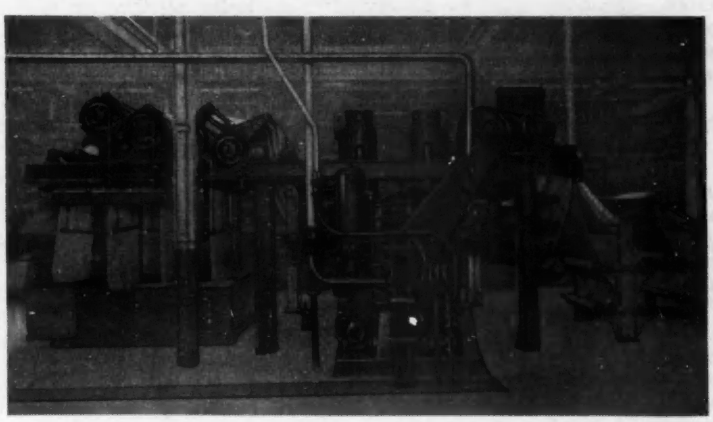


Fig. 35. Hydraulic pressure for this finishing press is provided by a self-contained hydraulic pump, whilst pressing operations are controlled by a fully automatic valve

Upgrading Bast Fibres in Manufacture

Bast fibres in the raw state can be subjected to mechanical softening treatment to extend the spinning range, or they can be treated chemically prior to or at some stage in manufacture to achieve similar results

By S. A. G. CALDWELL, F.T.I.

A NOTABLE feature of bast fibre production in recent years has been the progressive decline in quality, particularly of the two principal members of the group—flax and jute. This has not stemmed from change in demand by the spinning sections of the respective industries, being in fact contrary to their interests, as they really require an increasing volume of high grade fibre to meet the expanding market for specialised end products.

The causative factors are related to cost, which is linked to that of competitive materials. Production and marketing of bast fibres is laborious and expensive, the related operations permitting only a limited amount of mechanisation. In the bast fibre industry producers have endeavoured to maintain a profit margin by cultivating seed strains notable for yield rather than quality of fibre. Planned economies in handling and processing costs have in some instances also been effected at the expense of fibre quality.

As man-made fibre production increases the price of these will dominate that of natural fibre competitors. Economies effected by expanding production on a factory basis cannot be matched by comparable saving in natural fibre handling, so that the prospect of expanding output of the higher grades of material in the bast fibre group are remote. To meet the increasing needs of the manufacturing industries for their quality products the alternative lies in upgrading the material for processing in order to extend the yarn count and quality.

Fibres included in the bast group are located in the stems of the plants from which they are extracted. They have a compound structure, the fibre system of an individual plant usually comprising a number of composite strands extending practically the full length of the stem and linked together, as shown in Fig. 1, to constitute a network structure round the hard woody core of the stem. Various methods, biological, chemical and mechanical, are employed to extract the fibre from the plant. In biological action by retting, the inter-fibre binding substances are decomposed by bacteria so that the woody core and outer cortical tissue can be broken and scraped, or beaten-off subsequently by mechanical action. When treated by chemicals to free the fibre from its surrounding tissue the plant stems may undergo prior mechanical processing to reduce the bulk of material to be dealt with and consequently the cost of the process, as when spinning unretted, or "green" flax which is boiled in the rove stage.

Fig. 1. The illustration shows the fibre system of an individual plant, usually comprising a number of composite strands, linked together and extending practically the whole length of the stem

Spinning Quality

Factors determining the spinning quality of bast fibres include extent of separation of strands in the fibre system, cross-sectional area of fibre bundles, suppleness, extent and condition of the inter-fibre binding substances and the extraneous plant tissue retained on the raw material when marketed, and colour—which is not always a measure of spinning quality.

Dimensional characteristics are related to seed strain and rate of sowing. In good fibre strains of flax the main strands of the fibre system in each plant exist more or less as separate entities, linked up at intervals to constitute an open network system surrounding the woody stem. As such they are easily separable by retting, scutching and mill dressing operations. In the fibre system of the hemp stem and in inferior strains of flax, the main strands tend to merge into a continuous layer of varying thickness, which presents a flat fibred appearance when scutched, and is more difficult to split up in subsequent processing to dimensions required to spin fine yarns. Coarseness of fibre in all bast plants is related to density of sowing. Finer and longer stems—and consequently finer and longer fibre—are produced by increasing the rate of seeding.

While seed, soil and climatic conditions have an important bearing on spinning quality of bast fibres this is determined in greater measure by time of harvesting and method of fibre extraction. From the viewpoint of spinning quality the best time for harvesting is before the seed is ripe. As the plants and seed attain maturity chemical changes take place in the stem constituents and in the seed as a result of which the fibre binding substances offer greater resistance to maceration in retting and in the manufacture of wet spun yarns.

The method of retting for fibre extraction has an important bearing on fibre quality and on its behaviour in subsequent manufacturing operations. Flax, hemp and jute are usually water retted, During immersion, fermentation and bacterial action effect decomposition of the tissue in which the fibre system is embedded, loosening it from the cortex and woody core. As a result, the fibre is readily removed by stripping in the wet state—as widely practised with jute. Alternatively, the stems may be removed and dried, being subsequently crushed between fluted rollers to break-up the cortex and wood, which are removed later by scraping or beating in scutching.

The conditions of growth and methods of fibre extraction which

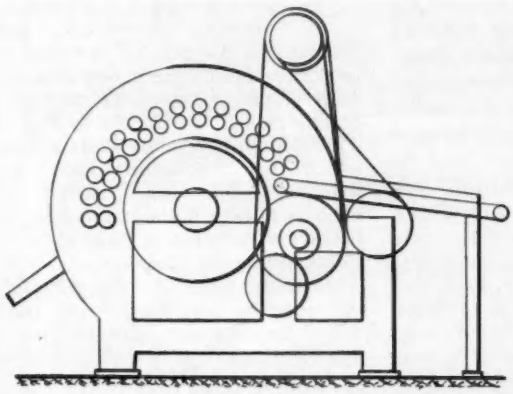


Fig. 2. The circular reciprocating type mechanical softening machine

largely determine subsequent performance are usually beyond the ambit of the manufacturer, who must select in the raw material market grades of fibre which he considers most suitable for his needs, obtaining the maximum count and quality range from these by blending and degree of processing. From the ample supplies of raw material formerly obtainable no difficulty was experienced in securing the quantities and grades required. In recent years, however, raw material supplies and the downward trend of fibre quality have posed a problem for manufacturers who have to cope with an expanding demand for quality yarns in fine counts.

With standard processing equipment and methods the upgrading of fibre in manufacture is limited, being defined by efficiency in management and skill of operative. These factors could be improved in many mills to make more effective use of the raw material available. The need for a measurable reserve of fibre quality in the economic operation of modern high speed machinery demands a high degree of skill and experience in fibre judgment and manipulation on the part of those responsible for purchase of the fibre and determination of its manufacturing requirements. The relationship of machine speeds and pinnings to requirements defines spinning range. Excess speeds and over pinning in dressing reduce yields by removing much of the finer fibre which is essential for spinning up, as it leaves a bare boned material of lower spinning quality.

A period of rest by storage in suitable conditions to allow the material to cool or condition following each processing operation improves spinning quality and performance. Card sliver or sliver produced on the automatic spreader benefits by storage in a cool dry store at a temperature of 50° to 55°F., with relative humidity around 65 to 70%. Where long runs are in production supplies can be regulated to ensure this. With smaller orders and frequent changes this may be more difficult, except for spreadboard or card slivers, of which reserve stocks can be kept of the various grades of material normally required.

In the manufacture of dry spun yarns the fineness of count to which any class or grade of bast fibre can be spun, the strength and regularity of yarn, varies directly with the cross-sectional area of the component strands. This is determined in the first instance by the quality of raw material, and in manufacture by the specifications, speeds and settings of the range of machines on which it is processed. Measurement of the strands of long hackled fibre before, during and subsequent to preparation, shows that the reduction in cross-sectional area is proportional to their length and is effected over the whole system. In the case of broken fibre or tow prepared by carding reduction in cross-sectional area of the strands on the drawing frames is practically negligible, so that the function of the tow preparing system is more or less limited to sliver weight reduction and fibre parallelisation. Consequently in the production of dry spun carded yarns by conventional methods the limit to upgrading is determined by optimum conditions for preparation.

The spinning range of bast fibres which, in the raw state, contain an excessive amount of extraneous plant tissue, can be extended by subjecting the material to a mechanical softening treatment, effected by passing it through a machine containing a series of pairs of intermeshing fluted rollers, the flutes being shaped and pitched to effect a flexing and kneading, rather than a crushing action. This removes much of the extraneous matter, leaving the fibre in a more open state readily penetrated by the pins of the dressing machinery.

Mechanical Softening

Two types of mechanical softener are used for processing bast fibres. The circular reciprocating machine shown in Fig. 2, has the advantages of compactness, a high softening action and considerable productive capacity. The short reach, however, makes it most suitable for treating the shorter staple bast fibres flax and hemp. In this machine a reciprocating motion is imparted to the fluted softening rollers so that the fibre passes several times through the nip of each pair, the forward movement exceeding the reverse

Fig. 3. A horizontal softener of the comb and trough type. This machine has an overhead emulsion sprayer and a graduated metering device to control the emulsion supply (Douglas Fraser and Sons Ltd.)

one. This is obtained by a double drive.

The horizontal softener in general use for long staple fibres requiring a considerable amount of work is employed extensively in the jute trade. A machine of this type made by Douglas Fraser and Sons Ltd., Arbroath, is shown in Fig. 3. It is fitted with an emulsion sprayer—seen overhead—and is the comb and trough type with a graduated metering device to regulate the supply of emulsion.

Mechanical softening leaves the fibre in an open condition in which it readily absorbs the batching emulsion, the function of which is to improve spinning performance and the handle of the manufactured product. The liquid usually consists of oil and water with an appropriate emulsifying agent. The function of the water is to penetrate the fibre, making it softer and more supple, while the oil acts as a surface lubricant which facilitates drafting and ensures a more level and less hairy yarn. The emulsifier usually has little direct bearing on fibre performance or yarn properties beyond ensuring correct distribution of water and oil. The fibre is rested for a period of 12 to 48 hours to permit uniform absorption, prior to subsequent processing.

Bast fibres may be treated chemically prior to, or at some stage in manufacture to extend their spinning range. The process usually consists of immersion for a period in a mild alkaline solution, followed by souring, washing and drying. Strict control is necessary to prevent separation of the strands and ultimates to a degree that would adversely affect fibre yield in manufacture, or the strength and end performance of the manufactured product. Chemical treatment on these lines has been applied successfully to (*a*) ordinary grades of retted fibre to extend the range of manufacture, (*b*) to the decorticated product from unretted flax straw which has been grown for its fibre, and (*c*) to the decorticated product from linseed straw to obtain a spinnable fibre.

Introduction of softening agents to increase the macerating action of the water in the spinning trough when wet spinning bast fibres is a simple and effective method of extending the yarn count and quality range. This was suggested following research on the flax fibre by C. F. Cross. The softening action of the water was intensified by addition of a soluble salt such as sodium phosphate. Adverse action of the chemical on the framework precluded practical application on a commercial scale. More recently the development of improved softening agents, and the introduction of chemically resistant alloys, etc., have pointed this as a simple and effective means for extending the wet spun count range of bast fibres.

The softening agents Cirrasol SA, Lissapol A, and Whitcol SES (I.C.I. Ltd.) were used by the late W. Cowden, of the Public Testing and Conditioning House, Belfast, in a series of spinning tests covering a wide range of flaxes. The results were highly satisfactory. In every case the resultant yarns were superior in appearance, handle, colour and freedom from hairiness to those produced from the same rove by the ordinary method of hot water maceration. Addition of the softening agent facilitates wetting out and penetration. The improved results were most evident in products from the lower grade flaxes.

The tests showed that the appropriate emulsion strength varies with different classes of raw material, and with the spinning conditions. Fibre quality is a dominating factor, the results being influenced also by trough temperature, time of immersion, and weight of rove. The improved materials and facilities now available suggest this as a practicable means of lowering the production cost of wet spun yarns.

Rove Treatment

A more widely practised method of extending the wet spun yarn count and quality range involves treatment of the rove prior to spinning to reduce the amount of extraneous matter present, facilitate wetting out and drafting on the spinning frame to produce yarns of good colour, full handle and a high degree of uniformity. This method also permits use of unretted raw material to provide opportunity for further economies in manufacturing cost.

Developed to meet the exigencies of war-time raw material shortage in the linen industry, rove boiling was largely discontinued by manufacturers in Great Britain on post-war resumption of flax exports from the Continent. It is, however, still practised by spinners in Europe, who have improved the processing technique and equipment used. With the progressive decline in production, and increasing shortage of high grade fibre rove boiling provides a solution to the problem of raw material cover for the profitable and expanding demand for quality and novelty end products.

The system developed and patented by S. Svenzon of Sweden, and described in B.P. 564,107 is typical of modern practice. The general arrangement of the details of the rove processing tank *A* is indicated in Fig. 4. This is fitted with a false bottom *B* on which the perforated tubes are mounted. The rove, wound on bobbins *C* with perforated barrels, is placed on the tubes, a cover *D* being positioned on top. Liquid is circulated through the system by the pump *E*, the quantity circulating being controlled by a mercury pressure gauge. The apparatus is provided with a steam gauge and thermometer.

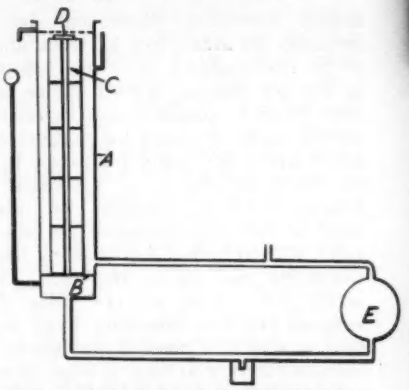


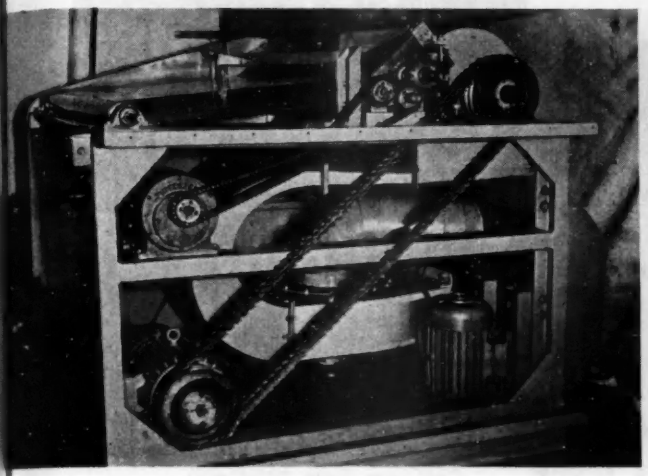
Fig. 4. The Svenzon rove processing apparatus, illustrated above is a good example of modern practice

The economic application of chemical processing on the lines described to other bast fibres must be measured by the extension obtained in spinning range, yarn quality, and the increased demand for the end products. Rove boiling can be most effectively integrated with the wet spinning process for flax and hemp, production being regulated so that drying is deferred until the yarn is spun.

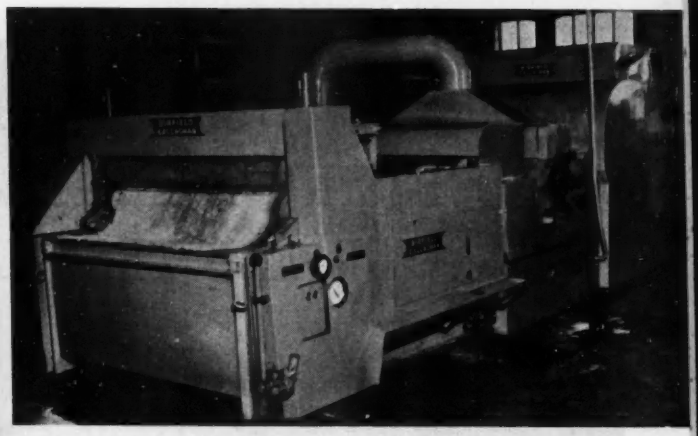
Chemical treatment of bast fibres prior to manufacture raises problems in handling, drying, and opening prior to preparation on the conventional range of processing machines, to which practical solutions have not yet been found and progress to date indicates the most appropriate stage for treatment as rove. For the production of dry and gill spun yarns the dried rove would require to be softened to facilitate drafting.

Cotton Board Appointment

Alderman J. W. Whitworth, J.P., has been appointed a member of the Cotton Board representing the interests of persons employed in spinning and doubling. Alderman Whitworth succeeds Mr. C. Schofield, O.B.E., J.P., who retired from the Cotton Board on March 31, 1960, for health reasons, after serving as a member for six years.



The Midhurst opener



40-in. fibre amalgamating plant for asbestos complete with impregnator

Fibre Amalgamating Machines

Special features in a range of new designs

THE technical press were recently invited to the new works of A. E. Callaghan and Son Ltd. at Liss, Hampshire, to see some of the new range of machines made by the company. Three machines were demonstrated, the Midhurst opener, the 40-in. fibre amalgamating plant for asbestos, complete with impregnator, and a 60-in. fibre amalgamating machine. In addition, the visitors were able to see the progress made on an 80-in. machine which it is hoped will be ready later this year.

The first machine demonstrated was the Midhurst opener. Claimed to have several advantages over conventional openers, it only takes 3 h.p. to operate it yet it is possible to feed material into it ranging from made-up garments, off-cuts and rope—even a 2-in. dia. rope can be opened into fibre form. An automatic braking system ensures the machine coming to complete stoppage in 8 secs. from a top speed of 1,400 r.p.m. The feeder is automatic and the patented feed head incorporates two feed rolls (one wire-wound, one plain) capable of adjustment as required to suit the type of material being opened.

The main cylinder is fabricated design and delivery of the processed fibres is assisted by the introduction of a fan which avoids the build-up of fibres at the delivery end. If desired a condensing roll system may be fitted at the delivery end to carry materials in pad formation to further operations thus dispensing with the use of a blowing room. It was stressed that the machine was representative of the way in which a unit could be built-up or used individually.

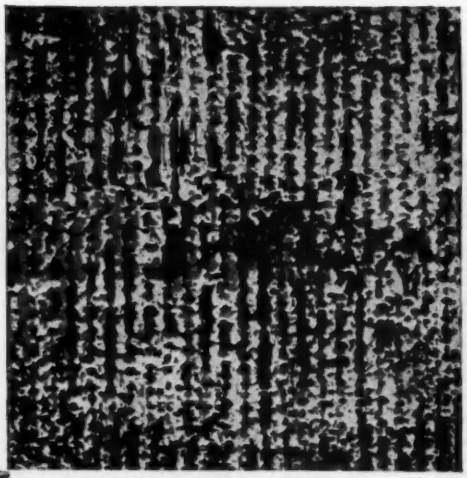
Another machine being developed —the Midhurst grinding machine— will grind waste rubber products into powder form. It will be possible to feed solid material into it and, in the case of a rubber tyre, the rubber powder will pass into one chamber and the textile component into another. One feature of the patented feed head is in opposing the direction of the material fed into it: some sixty or seventy teeth tend to hold back the material and at no time is the processing done by squashing the material. In fact the head may be lifted by one finger: the amount of inertia required to hold back the input is never more than 2 h.p.

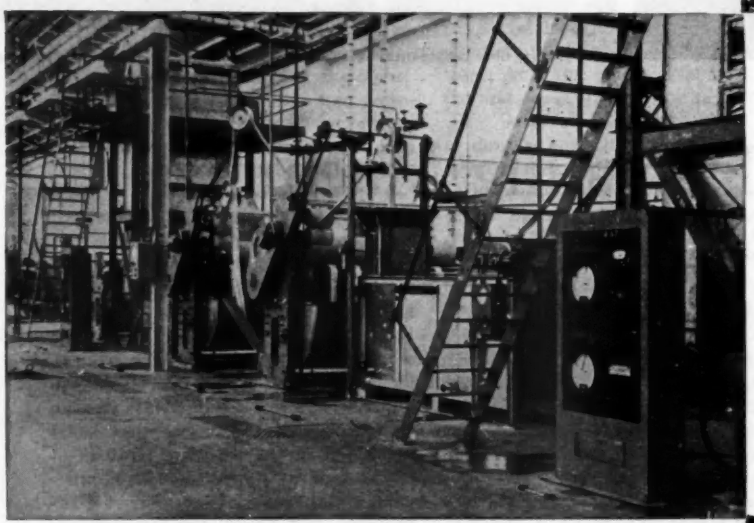
In the 40-in. fibre amalgamating machine for asbestos—described as the only one of its kind in the world—it is possible to feed in asbestos fibre in a continuous operation, turn it into a fibre pad and then impregnate with silicate. This continuous operation enables asbestos/silicate impregnated sheets to be obtained and these are finding increasing use for insulating purposes. This continuous operation permits 1,000 to 2,000 lbs. per hour of material to be processed. The machine operation is fully controlled and variable, and the weight of the pad across any section of its width is accurate to a fine degree. A feature in its construction is the dust reduction which is said to be some 40% less than on conventional asbestos processing machinery. The machine consists of an automatic hopper feeder unit—what is known as a randomised conception—and finally the impregnator unit.

Probably the most important unit demonstrated was the 60-in. fibre amalgamating machine, formed from five easily accessible units: (*a*) hopper feed, (*b*) pre-opener and leveller, (*c*) fibre amalgamation unit, (*d*) impregnator and dyeing unit and (*e*) the drying oven. It is possible to use the first three units and then if desired add the last two.

The hopper feed permits bulk supplies of raw material to be fed through a balanced door mechanism and an endless slatted feed moves the material slowly forward slowly thus ensuring constant supply to the spiked belt. The slatted feed belt, carried on a number of support rollers, has flanged end plates to assist the tracking of belts over long centres and provide for handling bulk quantities of raw material. The hopper section is bolted to the conveyor frame upon which the spiked frame is mounted; this unit may have further unit assemblies added if required. A combing action mounted on sealed

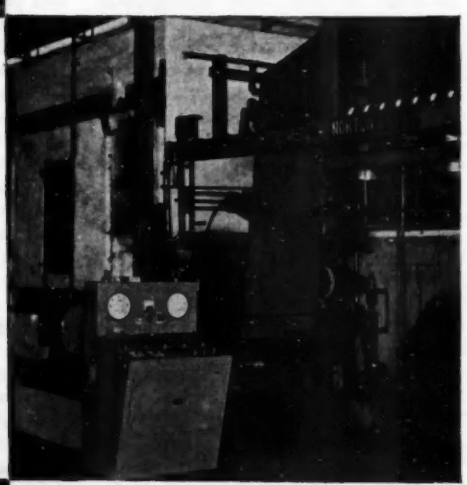
CONTINUOUS PROCESSING MACHINERY FOR ALL TEXTILES





Continuous Rope Bleaching Plant.
"J" boxes fitted with Du Pont type heaters.

Section of continuous Pad Steam Dyeing Range.



Farmer Norton continuous processing plants are made for

(1) Any bleaching, dyeing and finishing process.
(2) Cloth in rope or open width.
(3) Heavy or light cloth.
(4) Large or small output.

We make the full range of equipment needed and take full responsibility for complete installations.

Our wide experience is at your service.

FARMER NORTON

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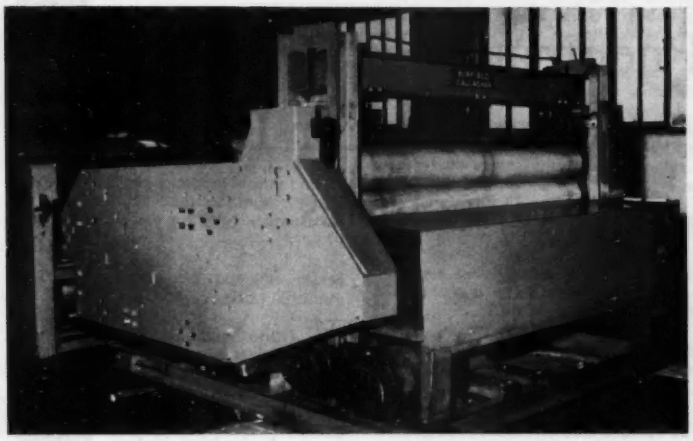
bearings, gives preliminary levelling of the fibrous material passing up the spiked conveyor plant.

An unusual feature is the use of bars which run between the spikes on the conveyor from the base to the top. It was explained that these are extremely important in the feeding operation, for the spikes which pass through this grid are only able to pick off a pre-determined "tuft" of fibres on each point from the bulk material. The remainder is returned by the action of the comb. Constant turning of the bulk material in this way gives greatly improved mixing. The spiked conveyors each carrying the "tuft" of fibres on the pins, pass into a low pressure air area where the fibres are removed and passed to a carefully controlled condensing system. The feeding unit has variable speed drives to the forward movement of the spiked sheet and has its own motorised fan.

The pre-opener and leveller is claimed to incorporate hitherto unknown features in design and construction. A metallic wound feed roll and feed plate receive the prepared material from the hopper condenser and, thus controlled, it is passed to the main metallic-wound cylinder, where the first working action on the fibres occurs. After this the fibrous material passes into the ventura section of a high velocity air current which deposits it on the rotating condenser cylinder; the latter has within it an evacuation area incorporating the completion of the closed air circuit. At this stage a level continuous lap is deposited on the perforated condenser cylinder, and the lap is then automatically conveyed to the fibre amalgamating unit, where it is again received by a metallic-wound feed roll and feed plate.

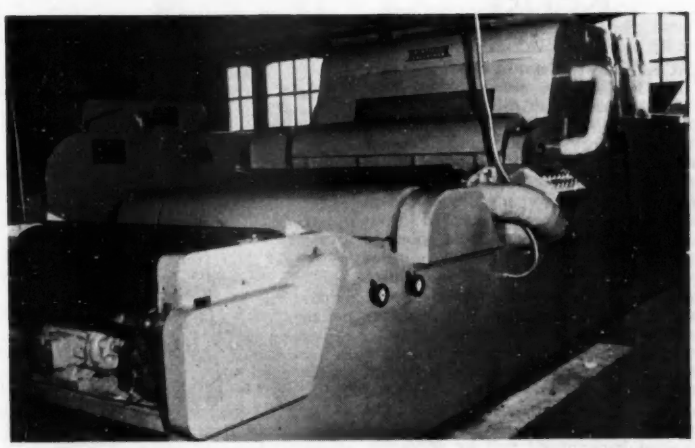


Impregnator unit of the Birfield-Callaghan 60-in. fibre amalgamating machine

The fibre amalgamating unit performs the final operation in the preparation of the fibres for impregnation or subsequent operations, and is similar to the pre-opener and levelling unit but with a much finer carding action. The level randomised mass is finally ready for passing to the next operation: the impregnator and/or dyeing unit. The present belts are of nylon mesh, and a level squeeze is achieved by supporting the pressure rolls on steel tubes.

Two methods are available for impregnation: (*a*) brush and doctor roll system and (*b*) bath system. With the latter the web is completely saturated and reliance placed on the action of the pressure rolls to remove the surplus liquid and with heavier weights this is favourable: with lightweight fabrics the situation is different as the web is subject to disturbance when passing through fairly heavy viscous liquids; use of the brush and doctor roll running in its own bath can be advantageous in this case.

Advance development are for a cold dyeing bath dyeing unit to be incorporated: thus new dyeing techniques are made possible, especially when using the bath system. This technique may be incorporated in the impregnator or separately, the web being dyed, prior to drying. The drying ovens are manufactured by Spooner Dryer and Engineering Co. Ltd., Ilkley; they have collaborated closely with A. E. Callaghan and Son Ltd. in the design of this particular unit.



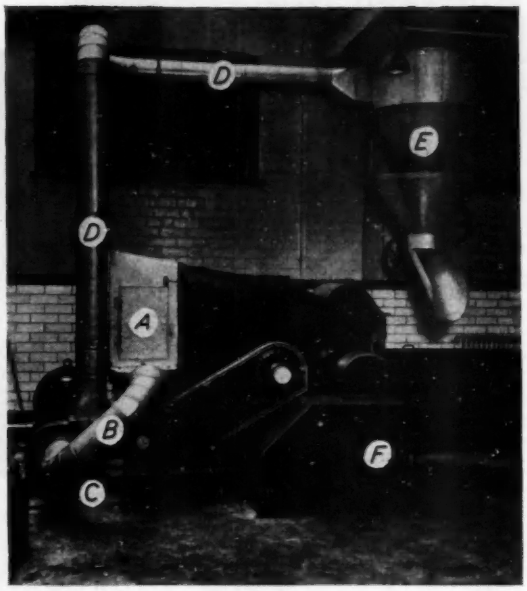
Fibre amalgamating machine showing (right to left) hopper, pre-opener, and leveller, and the fibre amalgamating unit (note the grouped controls for the complete plant)

More N.Z. Wool Sales

New Zealand expects to have more wool sales during the wool selling season (October to May) because wool sold at present auctions has increased by 30% over the past six seasons. Sales of wool there in the 1958-59 season totalled more than 1,200,000 bales. Mr. G. A. Duncan, (chairman, New Zealand's statutory wool auction sales committee), said in Wellington that from preliminary discussions on wool marketing problems it has been approved in principle that there should be smaller, more frequent sales. They will be spread in the first instance over a period approximating to the present wool season avoiding any simultaneous North and South Island sales. Mr. Duncan said: "It is impracticable to introduce the revised roster before the 1962-63 season at the earliest because wool buyers and brokers must effect re-organisation and sales training." There will be opportunity, he said, for woolgrowers' representatives on the committee to discuss proposals fully with the farmer organisations before any final decisions. During the committee's discussions, representatives from overseas shipowners attended.

Pneumatic Bit Remover Mechanism for Rag Machines

By N. C. GEE, F.T.I.



A—modified bit-box, B—ducting, C—bit-box, D—ducting, E—distributor cones, F—variable speed feed roller mechanism

SHODDY manufacturers are showing keen interest in the new mechanism which recently became available for the highly efficient removal of rag bits from shoddy. Designed by Walker and Smith Ltd., Batley, Yorks., this innovation is undoubtedly one of the most modern methods of tackling an old problem in a very effective manner.

The illustration shows this new device added to the company's well-known rag machine. Consisting of a modified bit-box A which is constructed with a sloping base, the bits—which normally fall on to a flat base—now descend through tube B to bit-box C on the floor. From this point a fan blows the bits up the vertical and along the horizontal sheet metal circular ducts D to the distributor cones E. The lower cone has a chute attached to its base down which the bits slide and fall on to the feed sheet at a convenient distance from the feed rollers. Here, the operative spreads them amongst the rags being fed in.

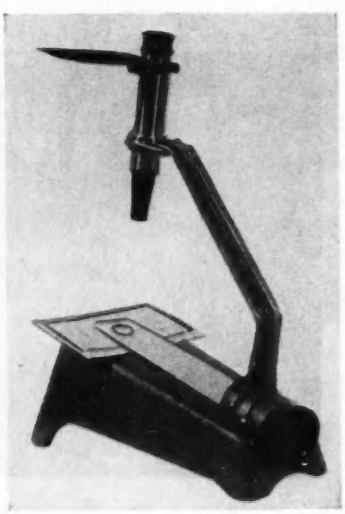
"Bits in the shoddy" can now be virtually eliminated and the mechanical handling of this material also relieves the workman of a task which has always demanded regular attention and no small amount of physical labour. It ensures that rag bits are returned to the feed-sheet in a small but continuous trickle and thereby spread throughout the whole of the blend. Previously, the operative emptied the bit-box manually, and only when a large quantity of bits was available, with the result that they were deposited in one place on the feed-sheet. Aided by this new mechanism he is now free to devote all his attention to the business of good feeding and the production of a better shoddy. Simplicity of arrangement is a further recommendation for there is very little to go wrong; moreover, it can be fitted to existing machines in a few hours.

The machine in the photograph is also equipped with the latest Walker and Smith variable speed feed roller mechanism at F, and independent electrical control of the feeding mechanism is provided. With it the feed rollers can be started, stopped or reversed at the touch of a button. A metal finger electrically-operated guard is also fitted over the feed rollers to protect the workman and light pressure on any one of the fingers automatically stops and reverses the motion of the feed rollers without stopping the swift. This all electrically-operated machine—the swift is driven by electric motor, grooved pulleys and V-ropes—is installed in the Textile Department of Dewsbury and Batley Technical and Art College, Dewsbury.

Portable, Lightweight Reader

PACKING when not in use into a very small space, the new V.C. personal reader recently introduced by Micro Methods Ltd., East Ardsley, Wakefield, is available in either monocular or binocular form. The reader is similar in appearance and operation to a low power microscope. It weighs only 3 lbs. and in its assembled state can be carried about with ease and convenience from room to room or from building to building. For longer journeys it can be stripped down to its component parts and packed into an attache case or with luggage. It is very easy to assemble again after stripping.

It can be used for reading both microcard and microfiche and gives a magnification of 20x. If additional illumination is required when microfiche is being read, a light source can be introduced. Normally the white card background will be adequate. The reader can be fitted with eye cups to cushion the eye and hold it at a constant and correct distance from the eye piece. To alleviate strain an eye blank is provided for covering the eye not looking through the eye piece. An extra arm and optical unit can be incorporated for binocular vision if this is required.



Reviews

STUDIES IN COMPANY FINANCE: A Symposium on the Economic Analysis and Interpretation of British Company Accounts. Edited by Brian Tew and R. F. Henderson. Cambridge University Press, Bentley House, 200 Euston Road, London, N.W.1 (price 35s.).

Before the passing of the Companies Act, 1948, published company accounts were of only limited value for economic analysis, chiefly because of the lack of consolidated accounts. The Act improved matters but did not completely solve this problem of the inadequacy of published data. Nevertheless, it did make available sufficient material for the exploitation and solution of a number of economic problems. The wise reader will examine carefully the statement presented in the first chapter of the "Studies," in which are indicated the purpose, scope, methods and major limitations of this inquiry into the financial position of 2,549 companies as revealed in their published accounts for the years 1949-1953. It could be argued that this material is out-of-date but it was, after all, the only material to hand for speedy exploitation and publication. The editors and analysts used standardised forms for the transcription of the published appropriation and balance sheets, and it is good to note that the Board of Trade has adopted this idea and has already published some of the results in Economic Trends. Sixteen "indicators" are employed to describe the characteristics, such as rate of growth and industrial grouping, of the companies and to lead to precise definition and close classification.

Of the sixteen chapters, ten deal with matters of general concern such as dividend policy, sources of finance and credit. The remaining chapters cover individual trades and industries among them being the cotton industry and retail distribution. The statistical appendix presents in condensed tabulated form the basic information used in preparing the studies. It may be thought that such a volume as this would provide rather heavy reading but, in fact, the great number of businessmen, and economists who will read it will find it both instructive and enjoyable. The project has been directed by the National Institute of Economic and Social Research and its finance has been made possible by Government grant under the Conditional Aid Scheme.

S.P.S.

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P.R. DIRECTORY, 1960. P.R. Directory, 79 Wigmore Street, London, W.1.

This is the first edition of a directory of public relations, press and information executives in industries, trades and services and it should prove a most useful work of reference for those seeking specialised information and assistance from P.R. representatives. It contains a list of business and industrial firms, societies and organisations with the names of contacts available in each, together with a list of consultants and indexes to firms and a generic list of their principal interests. The publishers have made a good start with this issue and later editions will no doubt be even fuller and more exhaustive.

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LANCASHIRE TEXTILE INDUSTRY. John Worrall Ltd., Central Works, Oldham (price 32s.).

Changes brought about under the Government reorganisation scheme are reflected in the 1960 issue of "Worrall's." Obviously considerable revision has been necessary and the opportunity has also been taken to effect some re-styling, resulting in a more compact volume. The main directory section is preceded by a list of firms deleted, many of which have joined the scheme and may be ceasing production at the end of March, 1960, but inclusion in this list does not necessarily mean that these firms have ceased trading. A particularly useful and revealing feature is the geographical analysis of the 398 spinning and doubling mills and weaving sheds closing under the Government scheme. In all respects the directory has been brought up-to-date and continues to be a most reliable and convenient guide to the Lancashire textile industry.

• • •

TEXTILE TERMS AND DEFINITIONS. The Textile Institute, 10 Blackfriars Street, Manchester 3 (price 17s. 6d.).

The foreword to this fourth edition states that previous issues have been sold out soon after they have left the printers. It therefore behoves those who wish to have available the latest agreed standard terms and definitions to order their copies quickly. The latest edition contains the revised substance of the three previous editions together with new terms relating to defects and fabric faults, etc., the total number of new and revised terms being about 1,700, an increase of 600 over the third edition. Distinguishing marks are used to indicate definitions which are tentative and those which have been discussed with the Terms and Definitions Committee of the Society of Dyers and Colourists. Details of fabrics are given in a uniform order from yarn count to cloth state and the volume ends with a classification of textile fibres which includes definitions of terms, such as "man-made fibres," which have been the subject of controversy on the Continent.

S.P.S.

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U.S.S.R. PATENTS AND INVENTIONS.

Interest in Russian scientific and technological experiments and achievements has grown apace during the last few years and the need has increasingly been felt for an English translation of Russian patents literature to be made available. Inventors, businessmen and research workers will therefore welcome the first translation in English of U.S.S.R. Patents and Inventions, of which Volume 1, Nos. 1 and 2 has been completed. This journal is the organ of the Committee on Inventions and Discoveries of the U.S.S.R. Council of Ministers and the English translation will appear monthly, each issue containing the abstracts from two Russian issues. The abstracts are arranged by subject groups. An additional service offered is the supply of specialised sections at annual rates varying from £10 to £15; the subscription for the journal itself being £50 per annum. U.S.S.R. Patents and Inventions is published by Pergamon Press Ltd., 4 and 5 Fitzroy Square, London, W.1.

S.P.S.

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BEAMS FOR COTTON, LINEN, SILK AND MAN-MADE FIBRE YARNS. British Standards Institution, Coronation House, Market Street, Manchester 1 (price 4s. 6d.).

A new British Standard (B.S. 3225 : 1960) deals with the following types of beams.

(1) High speed warpers' beams } for spun yarns and continuous filament yarns
(2) Weavers' beams }
(3) Weavers' beams with screw adjustment—for continuous filament yarns.

The committee responsible for preparation of the standard have provided detailed requirements for dimensions (including those for the ruffles of weavers' beams) and materials. Because of the range of materials available for manufacturing purposes they considered it inadvisable to include constructional requirements. Where applicable, dimensional tables are presented in association with "keyed" diagrams.

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FABRIC AND CLOTHING TRADES INDEX. Fabric and Clothing Trades Index Ltd., 299-301 Gray's Inn Road, London, W.C.1 (price 30s.).

The publishers have enlarged the scope of the 1960 edition to include an overseas section embracing Austria, Belgium, France, Germany, Holland, Italy, Sweden, Israel, Switzerland, etc., together with the "Tricel" buyer's guide. These innovations considerably increase the value of a directory, indispensible as a reference guide to all concerned with the fabric and clothing trades. The 508-page work lists relevant trade associations and publications, has a comprehensive "branded names" section, and includes classified London and Provincial sections for manufacturers and merchants of everything from artificial flowers to zipp fasteners.

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BRITISH ENGINEER'S HANDBOOK, 1960. Published by the British Engineer's Association, 32 Victoria Street, London, S.W.1. (price 21s.)

Maintaining its high standard, this annual classified handbook is a wonderful source of information for buyers of British engineering plant, machinery and accessories. Complete lists of association members are listed alphabetically, together with a classified list of manufacturers, trade names and trade marks, indexed in Portuguese, French, German and Spanish. Supplementary information—new members, address changes, etc., is included in the form of a loose leaf.

• • •

SHUTTLES FOR PIRN-CHANGING AUTOMATIC LOOMS. British Standards Institution, Sales Branch, 2 Park Street, London, W.1 (price 4s.).

This new British Standard (B.S. 3240: 1960) deals with a range of shuttles suitable

for weft pirns on pirn-changing looms specified in B.S. 2098, Part 2. The standard contains requirements for shuttles for cotton, spun rayon and other man-made fibres and natural silk. Although the shuttles have been designed for use with these fibres it is possible they may be found suitable for others. The industrial experts who prepared the standard have been in close touch with the International Organisation for Standardisation (I.S.O.). They have been working on proposals for an I.S.O. recommendation for loom shuttles; and are making every effort to ensure that any agreements reached internationally are in line with this British Standard.

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REZEPTBUCH FÜR FASERSTOFF-LABORATORIEN. By Prof. Dr. Ing. Paul-August Koch, Springer Verlag, Berlin. 1960. pp. 239 (price DM 31.50).

The increasing use of old and new synthetic fibres has made the identification of fibres and their qualitative and quantitative estimation in fibre blends of considerable importance to the technologist in textile works' laboratories. The author has collected all data and information of microscopical, physical and chemical tests and presents them in a very readable and helpful way, since he provides concise and clear instructions for carrying out fibre analysis.

After a survey of chemicals and special reagents used in fibre identification and a classification of natural and synthetic fibres (amended up to July 1958), he describes physical and chemical, also staining, methods for the qualitative analysis and explains typical identification tests for each fibre; also physical and chemical methods for quantitative fibre analysis. Another section contains recipes for analysing and determining fatty matter in wool, testing the presence of dulling agents often used in the production of synthetic fibres, identification of sizes, dyes on fibres, analysis of mordants, resins and other finishes. Methods are also included for the identification of mothproofing, flame and waterproof agents, and mechanical, physical and microscopical tests for defects in yarn and fabrics. A comprehensive bibliography, author and subject index completes the book. It is printed and produced with a flexible plastic cover. It is a very practical and instructive textbook on the subject.

B.S.

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TRAINING MADE EASIER. Published for D.S.I.R. by H.M.S.O. (price 2s.).

No. 6 in the D.S.I.R. "Problems of Progress in Industry" series, this booklet deals with two basic questions facing anyone concerned with training manual operatives. It emphasises the need for careful planning before setting up systematic training, for which the three key points are:—

(1) Observe how the experienced operator does the job and analyse in detail the mental and physical components of his performance.
(2) Fit the training method to the job. The research indicates ways of speeding up and improving learning efficiency.
(3) Get expert advice. The design and introduction of training schemes should be supervised by a specialist with psychological training.

(*continued from page* 180)

magnetic name weaving apparatus system "Huttwil." The control mechanism contains a series of 44 contact rollers, each having its own function (letter, punctuation, fancy border weave effects). The combination of the functions necessary to weave a given name is carried out by the weaver, who combines the desired effects of the contact rollers by establishing contact with the help of plugs pushed into the holes of the control box cover, the latter constituting really a distribution panel. Whilst this name weaving is done, the second half of the distribution panel is available for preparing the name combination for the next order. To go over from the first to the second order, it is only necessary for the weaver to reset the loom unit counter to zero and to switch the one half of the distribution panel over to the other half.

• • •

KNOTEX MASCHINENBAU G.M.B.H., Augsburg, are exhibiting their compact, precision-built, warp tying machine. It will be shown in operation on looms weaving cotton, silk, and stretch nylon yarns, thus illustrating the versatility and inherent adaptability of this portable, labour-saving device. Weighing only 30 lbs. and with particularly small dimensions, the Knotex is simply and quickly operated by female labour, its light weight ensuring that no undue strain is placed on the operative concerned.

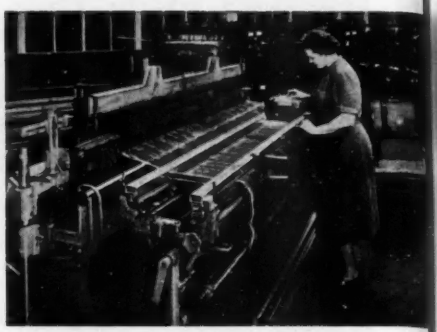
Said to cut overheads considerably, Knotex ties any type of yarn, with the exception of jute, in any of the usual four types of knot. The selection can be quickly and easily made. Tying in takes place either in the loom, at the loom, or on a frame, the tying speed being adjustable to suit the material, and also regulated to give twelve different speeds at a maximum of 400 knots per minute.

• • •

TEN models will be shown in operation by Whitin Machine Works, Whitinsville, Mass. Highlighting the display will be an entirely new 14×7 in. roving frame, designed to run with flyer speeds up to 1,000 r.p.m. A second entirely new machine will be the Whitin American worsted comber. A six-head machine running at 125 nips/min., it basically resembles the Super J comber in combing function. Its production is approximately 70 lbs./hour with efficient nep removal, a broad range of noil extraction, and selective removal of short fibres only with very low non-uniformity percentage of sliver. Slivers are deposited in 18×36 in. cans in front of each head. The new comber can be used for high production runs; the individual heads can be run with different stock and can be fed from either can creel or laps.

Whitin also show the new Flex-Spin wool spinning frame. It has up to 16 in. traverse, reciprocating ring and spindle rail motion, single balloon control ring, and a heavy-duty head end. The new machine will be available in gauges from 4½ to 7½ in. and in appropriate spindleage for each gauge. The Super J comber will also be in operation. Several design changes have been made including overarm weighting and anti-friction top rolls in the draw box and a new half lap.

The Whitin super lap machine on view demonstrates a new technique and method in preparation of comber laps and a four-



Knotex warp tying machine in operation on a tying-in frame

delivery Even-Draft drawframe is capable of speeds up to 600 ft./min. on carded work and 450 on combed. Important changes include a new V-belt coiler gear drive, improved pneumatic waste removal and additional anti-friction bearings have been added.

Representative of the more than 50 twister models made by Whitin. The new Pacemaker P3 twister displayed features straight line yarn delivery path, wider spread use of anti-friction bearings, vibration absorbing construction, and many other features for production of low twist filament yarns. Another new twister is the Commodore, heavy duty, 10-in. gauge 8-in. ring twister especially suited to the large package high production of knotless yarns for the tyre cord industry. Additional Whitin machines will be in operation in other exhibitors' booths. Among these will be the new standard spinning frame on the Bahnson Company stand. It is a new 27-in. frame designed to provide the industry with a low cost frame with improved balloon control rings, integral waste removal and advanced top roll mounting and weighting. (The British agents are A. E. Aspinall Ltd., 16 Cumberland Street, Manchester 3.)

• • •

THE machine exhibited by Tomlinsons (Rochdale) Ltd. is their well-known 36/AZ model fitted with their auto-zero mechanism and the "Shirley" napping action indicator. This remarkable equipment is designed to ensure (*a*) the automatic location of the point of practical zero napping and (*b*) exact measurement of the power absorbed by the worker rollers. This enables the user to decide exactly the degree of napping energy to apply to any piece of cloth, at any cloth speed, during any napping run. This machine is made in three models—30/AZ Auto Zero Mark III, (*a*) series 2 double action with 30 rollers, (*b*) series 3 double action with 30 rollers, heavy duty type, and (*c*) series 2 double action, with 36 rollers. These three practically cover the entire field in nappying requirements.

DU PONT MAGAZINE. A recent issue of this internationally circulated house journal features the usual crop of interesting articles showing how Du Pont products are employed for a multiplicity of purposes. Included in this one are "Plastics: Prolific Pioneering," "Tats in Orlon" and "The Mid-Weight Suit."

(*continued from page 177*)

twist insertion by centrifugal spinning-pot was a revolutionary innovation. This has now moved into the consolidative division, since developments over the last few years have been concerned with eliminating the need for subsequent handling for washing and bleaching treatments.

The rate of elevation from one trend to another will depend upon many factors, not least of which is the cost of labour for machine operation. If labour costs rise at a faster rate than power costs, then the consolidative trend will be stimulated. A further factor is the method of marketing. Mass production requires mass-marketing and nations with state-controlled manufacture and distribution of consumer goods will have a different emphasis on their technological trends, compared with those whose economy is based on free enterprise. Thus, so-called unconventional machines which are relatively inflexible in the type of products they can manufacture interest the "planned economies."

Recently, Mr. R. F. Armitage (chairman, Armitage and Rigby (Holdings) Ltd.) stated that conversion of an efficient weaving-shed operating Lancashire looms to two shifts on automatic looms would reduce costs by only ¼d. to ½d. per yard on some cloths. This is typical of the marginal trading position of some sections and it has been suggested that it might be more profitable to concentrate on the distribution side rather than upon technological trends. Attention to distribution is undoubtedly economically desirable but it also increases the need for good design. For instance, piece lengths longer than those supplied at present would be of benefit in the leathercloth industry.

But if this is to be achieved then looms must be designed to handle these larger piece lengths, the cloth being taken to a lower level than the weaving station.

Immediately, the possibility of patrolling inspection suggests itself as a consolidative trend. In the higher-prriced fabric field also, it should be possible for the machinery designer to contribute towards the reduction of costs of speciality fabrics.

Role of the Industrial Designer

By PROFESSOR MISHA BLACK, O.B.E., R.D.I., P.P.S.I.A., M.Inst, R.A.†

I HAVE only two points to put before you. First, that industrial design, as a conscious activity indivisibly related to, and yet partially separated from engineering as such, is a marginal bonus in your industry: it clearly does not play a part comparable to the importance of appearance design in consumer industries. A refrigerator or electric cooker may be bought for appearance alone with its mechanical efficiency taken for granted, but no mill owner will buy expensive machinery just because it looks nice. Secondly, designing machinery is not a task for inexperienced aesthetics with theories about the beauty of machinery in motion.

Having said that, two positives spring from these negatives. If two machines performing identical functions are equal in efficiency, price and delivery, the better appearance of one, the fact that one machine immediately reflects it efficiency in its overall appearance (while the second is redolent of the 1930's), can be the last small scale which clinches the sale. It follows that if appearance can, in marginal cases, be of such importance, someone must be consciously aware of this factor in machinery design and press consistently and relentlessly for its being taken into proper account.

Let us have no illustions about the function of industrial design. Most machinery works well enough without concern for its appearance. The pattern shop lash-up of a new machine will work effectually and efficiently and will do well enough if no one is worred about its appearance on the factory floor, its impact on potential buyers or the well-being of its eventual operators. But if the machine is to reflect in its appearance its technical excellence and thus immediately impress its buyers, if it is to be ergonomically satisfactory, if it is to be easy to clean and maintain, then some one must care about these secondary factors in machinery design.

The responsibility for this attention is clearly top management. The easy quick design solution is rarely the best answer; if management does not care about the visual and ergonomic qualities of its products, then that couldn't-care-less attitude will seep through the whole factory organisation, will infect the design and drawing office so that every machine built will echo the approach which sees profit only in the cheap and merit only in the meretricious. Unless the directive from the board room is to produce machines which will stand proudly in factories throughout the world as exemplars for our foreign competitors, then all consideration of detailed design policy is wasted endeavour. Often have I praised a machine tool in a factory only to be told it is foreign.

How are we to ensure that textile machinery immediately reflect, in their appearance, their technical supremacy? The answer is not found by the simple expedient of employing a consultant designer or, at least, not by that alone. The factory drawing office must be trained to *see* what they are designing, to visualise in three dimensions as they solve the complex problems of engineering design; the chief designer must see the machine as a whole—not as an accumulation of parts.

This requires positive education or re-education so that every design decision taken embodies an appreciation of style. Every modification to an existing design must be related to the total concept: the machine must not appear "added too" like patches on a worn-out suit. The moment when modifications multiply so that they overwhelm the original basic design, must be honesty faced even if this requires massive re-tooling to produce a new model.

Some of the most outstanding designs in the engineering industries have been produced in design offices which have been pervaded by this sense of style, where the need for the advice of outside consultants has not existed; but where the need for visual training remains, the services of consultant designers can be a valuable expedient. The consultant may be an expert in the products of the factory which seeks his services, but more commonly his expertise is in seeing where others have ceased to see, in acting as a critic and catalyst in the factory's own drawing office, as an ally to management in re-establishing that appreciation of form and control which should later be an integral part of every design decision on the drawing board and in the prototype shop.

Once this feeling for appearance has been regained, and has become the living yeast within the factory organisation, once the ancient dogma of "where there's muck there's money" has been relegated to the past where it belongs, the design sense can influence the whole attitude of a firm. It can spread to the appearance of the factory itself, the livery of the service vehicles, the label on the export crates, the catalogues and instruction manuals, and can give to a firm that general atmosphere of "forward looking" which should be reflected in the company's letter heading as clearly as in its products. These are matters in which trained consultant designers are expert and experienced. The importance of the "corporate identity" is now commonly accepted in the U.S.A. and is understood by many firms in Great Britain: it is folly to disregard it.

But no "corporate identity" or "house style" or "face of the firm," however expertly conceived or brilliantly publicised, can for long increase the sale of products which themselves appear outmoded: no product, however technically efficient, can for long successfully compete with others which *look* more efficient. The face of a man is a mirror of his character, the appearance of a product is an indication of its operational excellence. There are now industrial designers in this country with accumulated skill and experience—it is worth testing whether they can work as effectually in your industry as they have in others.

* *From a paper at a recent conference organised by the Council of Industrial Design at the B.R.R.A., Heald Green, Manchester.*

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Employment in Wool Industry

The Wool Industry Bureau of Statistics annual census of personnel shows that, at December last, the total employed was 193,301, compared with 184,847 a year earlier, an increase of about 5%. Workers employed in the five principal sections of production—woolcombing, woollen and worsted spinning and woollen and worsted weaving—totalled 152,640, an increase of 5½%.

Society of Dyers and Colourists

Dyeing Acrylics in Yarn Form

PRACTICALLY all the yarn consisting entirely of acrylic fibres dyed so far in this country, had been of the high-bulk type and three methods had been widely used for producing such yarns: (*a*) by blending "regular" and "high-shrink" staple, usually on the card, for spinning on the cotton system; (*b*) via the Pacific Converter, in this case fitted with a heat-stretch unit; (*c*) via the Turbo-Stapler. Of these, the last-named was probably the most widely used, observed Dr. J. F. Gaunt, F.R.I.C., F.T.I. (Patons and Baldwins Ltd.) in an address to the recent one-day symposium of the Midlands Section of the Society of Dyers and Colourists. In each case, however, the yarn shrank by 18-25%, depending on the particular fibre and conversion process used, and the general dyeing problems were similar.

For dyeing any type of yarn there were three general designs of machine (*a*) packages, (*b*) hanks which were moved mechanically through a static dye-liquor and (*c*) hanks which were held stationary and through which the liquor was circulated. Dr. Gaunt referred to numerous attempts made to dye high-bulk yarns in package using modifications so that relaxation could take place during dyeing. A recent modification consisted in winding the unrelaxed yarn on to a mandrel about 3 in. dia. around which was a sheet of foamed polyurethane rubber or similar material about ½ in. thick. The packages were wound on a 6-in. traverse, with 12-16 ozs. per package, and were transferred on to standard cheese-dyeing spindles. When the yarn shrank during relaxing, the foamed rubber core supported the inner layers of yarn. This process was effective for giving levelness of shade, but appeared to lead to a considerably leaner yarn than dyeing in hank.

On the question of hanks moved mechanically through static dye liquor, reference was made to the new Clermont-Bonte "Rotamatus" machine exhibited at Milan. There was, however, no similar machine in Britain at present and no information available. With stationary hanks, through which dye-liquor was circulated, this machine, in the form of the Hussong or double-stick types, was by far the most widely used for dyeing hosiery yarn including acrylic yarn and, in fact, several types of double-stick hank-dyeing machines were now being used.

When loading this type of machine with high-bulk acrylic yarns, the choice must be made between: (*a*) loading the yarn unrelaxed, with the stick separation set for the relaxed distance, and relax and dye at the same time; (*b*) loading the yarn unrelaxed and then plunging into boiling water and cooling. This was then followed by dyeing in a fresh liquor; (*c*) relaxing the yarn in steam prior to dyeing. The hanks could then be loaded in the dyeing machine in a similar way to worsted hanks.

Regarding dyeing there were two mutually contradictory requirements—increasing the liquor flow to obtain good skein penetration, and decreasing the flow to preserve the condition of the yarn. This was a matter in which each dyehouse must decide at which point the line must be drawn. Discussing dyestuff selection Dr. Gaunt said there were only two groups of dyestuffs of any commercial importance, disperse and basic. The pre-metallised dyestuffs were undoubtedly useful on tops for high fastness requirements, but they required temperatures which were much in excess of those reached in any hank-dyeing machine. Pale and medium shades were almost invariably produced with disperse dyestuffs, but when dyeing with basic colours it was customary to control the pH of the liquor to the region 4·5-5·5.

It was not easy to be definite about the methods best suited for producing level shades with basic colours, he said, but developments were proceeding: (1) Careful control of pH and temperature without addition of auxiliary products. (2) Using cationic retarding agents, usually of the cetyl-trimethylammonium bromide type. (3) Using anionic aggregating agents in presence of a non-ionic dispersing agent.

Softening was the last stage of processing in the dyeing of acrylic yarn, but of the utmost importance, since serious complications could arise if it were not correctly carried out. In the case of softening yarn-dyed acrylic yarn, the softening agent was applied not only to render the knitted garment acceptable in handle to the eventual wearer, but also as a fibre lubricant to assist the knitter. The amount of softening agent appeared to have a critical effect on the co-efficient of inter-fibre friction in more or less the same way it had on handle. If the amount of softener was too low, the handle was harsh, and the garments knitted from the yarn were too tight. If the amount was too large, the garments tended to be flabby and cases have been known where the over-lubrication was so great that the fibres slipped past each other, giving the impression that the yarn was tender. If by any mishap the softening was irregular, the effect was likely to be seen as an unevenly knitted garment but it would be rash to state that softening could be more than a contributory factor in such cases.

The fastness of dyestuffs on acrylic fibres was of a very high standard but this was unfortunately not the case with cationic softening agents.

Society of Dyers and Colourists

"Courtelle" Yarn, Performance and Fabric Structure

"IF we considered standard yarns we could use a purely conventional system, or alternatively, use a converted top from tow, thereby saving one combing stage. The advantages of tow dyeing for the standard system were most apparent when a modified spinning system was used, which would enable the yarn to be produced from a converted tow without the intervention of a combing stage, and rather large weights could be dyed, with less handling of material, though early selection of shades had to be made," said Mr. H.D. Edwards, Ph.D., A.R.I.C. (Courtaulds Ltd.) in an address to a one-day symposium held by the Midlands Section of the Society of Dyers and Colourists on "Courtelle"—Influence of Yarn and Fabric Structure upon Performance in Dyeing, Finishing and Wear."

"In yarn dyeing, selection of required shades may be left until the last possible moment, though limited dyeing weights have to be contended with, and the various dye lots must be kept separate to avoid wastage. With high bulk yarns there were only two suitable methods, i.e. yarn dyeing and tow dyeing, as this yarn consisted essentially of a high shrinkage staple blended with a relaxed staple which, when spun together and subsequently relaxed, acquired special properties.

When dyeing high bulk tow, although early shade selection and stringent attention to fastness requirements were essential the tow could be compressed to give economic machine loads, and consequently very large weights could be dyed to any one shade."

Dr. Edwards then mentioned a further method—piece dyeing—and said there was a marked difference in the handle secured from yarn and piece dye goods. He then showed how the interdependence of construction and dyeing and finishing practice contributed to the state of the finished

garment. Examples were shown indicating how the structure of a garment could be distorted during dyeing and finishing; in one case a ribbed structure extended in all directions owing to the fact that the knitted fabric was not firm enough in construction to withstand strains and stresses imposed in the dyehouse. A further case compared poor wear performance due to lack of dimensional stability with a well-constituted garment which had retained its shape and maintained excellent wearing properties.

Although differences in shrinkage were related to different relaxation methods, i.e. pressure steam, atmospheric steam or boiling water; if the garment was well constituted in practice little difference had been noted, provided that excessive mechanical action had not taken place. Garments with a marginal construction, when given prolonged boiling or extra mechanical motion, may easily have produced a poor garment, and Dr. Edwards said it was the aim of his firm to work closely with all sections of the trade to ensure that garments were made efficiently with a certain margin of safety both in constitution and processing. Thus, satisfactory piece dyeing relied in some measure on efficient construction at the knitting stage.

For drying "Courtelle" high bulk knitwear, tumbler drying was recommended, which being relaxed, gave maximum bulk to the fabric, and here two examples of circular knit standard yarn fabric were shown, indicating how tensionless drying gave improved bulk and handle.

In deciding between piece and yarn dyeing the softer handle given by the first-named might be compensated for by using coarser denier—although the yarn count could preclude this. Dyeing at the yarn stage was then suggested, this method usually being adopted in the case of delicate fabrics. The advantage of piece dyeing therefore lay in delay of choice of shade but, owing to more violent treatment, a dependence on adequate construction is more vital.

Having reviewed the various methods of dyeing, Dr. Edwards said it was very evident that the production of satisfactory goods relied not only on the technique used in arriving at a suitable structure for goods which have to be finished, and all this called for the closest co-operation between dyer and knitter. The aim here was to have a crisp material with a firm handle and good stability to washing and general wear. Here "Courtelle" has been successful, in part due to correct choice of structure in required fabric. It was usually desirable to work from tow or slubbing dyed yarn and a fairly coarse denier was used in a medium high twist fine counts yarn (usually 32's or 36's) with the fabric knitted very firmly. The material was scoured to release knitting stains and remove dirt, then given a low temperateur drying followed by cropping and decatising.

Although important to preserve the crisp handle, it was undesirable to stiffen up too much in the finishing as this gave an unpleasant, thin, lean, fabric. The use of unrelaxed high bulk yarn in single jersey construction made it possible to knit a structure which, after relaxation, was firm enough to be piece dyed and thus gave a firm fabric of soft handle with good stability to wear and washing.

Dr. Edwards then considered knitted outerwear in more detail, and the many types in demand, examining the different handles obtained by using high bulk yarns when given various finishing routines. In decreasing order or crispness for equivalent counts and denier on the same machine there were:—

(1) Yarn dyed steam finish.
(2) Yarn dyed, scour, soften, tumble, dry, steam finish.
(3) Piece dyed from relaxed yarn, soften, tumble, dry, and steam finish.
(4) Piece dye from unrelaxed yarn, scour, soften, tumble, dry, and steam finish.

Therefore, for a bulky heavy knit type of garment where maximum crispness was desired, a coarse denier should be used, and character of fabric maintained by working with dyed yarns and a simple steam finish. When maximum softness was required, unrelaxed yarns was used, piece dyed, and given full finishing routine. Where it was necessary to get a better draping effect from dyed yarn, it was sometimes necessary to make an alteration in yarn count and machine gauge, but the lecturer reminded his audience that in every case a good construction should be employed in order to give the required performance.

There was a further way in which the structure could be modified, and that was by incorporating a second fibre. Cotton was used with "Courtelle" to give greater resistance to high temperature processing, while the acrylic component provided bulk, quick drying and comfort in wear, and this blend was successfully employed for men's underwear. Blended with wool, "Courtelle" gave good dimensional stability and also added lightness to the fabric, while nylon contributed its outstanding abrasion resistance. It was also possible to make use of the elasticity of crimped filament yarn, and the incorporation of "Courtelle" gave a full handle. Obvious outlets for this blend were swimsuits and socks.

Courtaulds' Conference—Fibres in Carpets

OVER sixty executives in the carpet trade representing manufacturers, wholesalers and leading retailers, attended a carpet conference held recently at Celanese House, Hanover Square, London, W.1. Organised by Courtaulds Ltd., it comprised the reading of papers by experts, an informal discussion, and an exhibition of carpets and of the testing machinery used in the Courtaulds' laboratories for use-testing every variety of carpet fibre and construction. The conference was opened by Mr. C. F. Kearton, a managing director of Courtaulds, who welcomed the visitors and invited them to say what they thought of man-made fibres in carpets, and to make suggestions as to production or sales promotion of carpets.

Technical Aspects

The first paper—by Mr. J. A. Kirby of Courtaulds (Coventry)—discussed many technical aspects of man-made carpet fibres and described something of the elaborate testing carried out at Bocking. Mr. Kirby pointed out that one of the main conclusions from this research was that high pile weight in a carpet is the most important of all the factors which influence good wearing and appearance qualities. Courtaulds' "Fibro," because it has a low and stable price, makes possible carpets of very much higher pile weight—and therefore better performance—than all-wool carpets costing the same. Mr. Kirby concluded by discussing possible future technical developments in carpets including the production of new staple yarns, the use of filament bulked yarns in tufted carpets, and resin treatment of yarns for better performance.

Carpet Sales in the Future

Mr. J. M. Low, head of Courtaulds' market research department, talked about the commercial aspects of carpets containing Courtaulds' fibres, with particular reference to future sales and the maintenance of the boom which the industry has been experiencing since 1945. He referred to the results of market research his department has been doing over a period of years to illustrate where future sales must lie. Among the points emphasised were that only half the bedroom floor space in the country was carpeted, and that one-third of the domestic carpets in this country are over ten years old—and therefore almost certainly in need of replacement. Thirdly, that in the next few years the teenagers in the "bulge" would be newly-marrieds setting up homes for themselves. Mr. Low concluded: "If the younger market is to be captured, carpets must become status symbols for the young householder."

Carpet Testing Service for the Trade

A lively discussion followed and many questions were put to the Courtaulds' panel of seven experts. The most interesting part of the discussion ranged around the question of quality control and, in answer to a question, Mr. Kearton stated that Courtaulds' laboratories were fully equipped to assess the quality of any carpet containing man-made fibres. He invited manufacturing, wholesale and retail trades to make use of these testing facilities. He expressed the view that nothing but good could come from an accurate laboratory assessment of carpet performance qualities, whether the carpets were already in production or were new developments which were being contemplated for commercial production.

Further discussion raised the problem of identifying the quality of a carpet when it is in the retail store, and Mr. Kearton announced that Courtaulds are at present considering a scheme whereby carpets containing Courtaulds' fibres would fall into more than one category. Categories would probably be "Standard Quality" and "Heavy-Duty Quality" and the problem of identifying carpets according to these categories was at present being thoroughly explored.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

Broadloom Carpet Printer

This new machine consists briefly of an engraved roller on which the pattern is picked out in relief and coated with a sponge-like material.

A TECHNICAL development which should have far reaching effects on the tufted carpet industries of Britain and other countries is announced by British Tufting Machinery Ltd., Whitebirk Drive, Blackburn. What is claimed to be the first broadloom width carpet printing machines are now being built at Blackburn and already one of these units, to print carpet 15 ft. wide, is ready. This machine embodies a patented principle developed by B.T.M. as a result of a comprehensive programme of experimental work.

Briefly the new machine consists of an engraved roller on which the pattern is picked out in relief and coated with a synthetic sponge-like material. This roller rotates in a bath of dye liquor. At the base of this bath is a roller which presses against the printing roller. This is important as it discharges the foam material and when the pressure is released the foam takes up a full charge of printing liquor. As the roller turns and the pattern emerges from the bath a series of air jets across the full width of the roller eliminate any bubbles that may be present. The roller then comes to the top centre position immediately beneath the pile of the carpet to be printed.

The carpet is passed, face downwards, over the roller. As the roller and carpet speeds are synchronised there is absolutely no friction between them. This means that wear is kept to a minimum and there is no danger of the pattern being smeared. Printing may be applied to either cut or loop pile carpeting with no difficulty.

Printing takes place by passing the carpet over the face of the roller with the pile facing downwards towards the foam material. Above the actual roller is a second roller that can be adjusted to any position, even to touch the printing roller. As the carpet passes through this "nip" between the two rollers, the foam material discharges a miriad of tiny jets of dye liquor into the carpet. The amount of liquor discharged and the depth of its penetration will, to a large extent, depend on the closeness of the two rollers and the thickness and density of the pile in the carpet being processed.

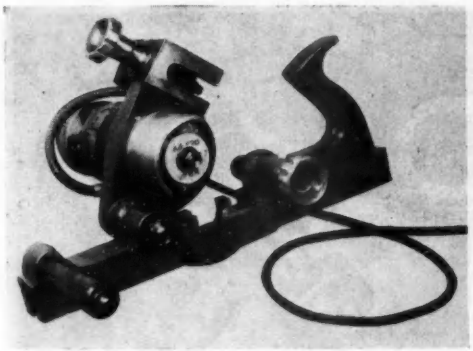
The machine is simple in concept and it seems, from preliminary costings that the process will compare exceedingly well with piece dyeing. It is not yet possible to state precisely, just what the price of printing per square yard of carpet will be. It is reasonable to assume, however, that quality for quality, the margin between piece dyeing and printing will be only a matter of pence.

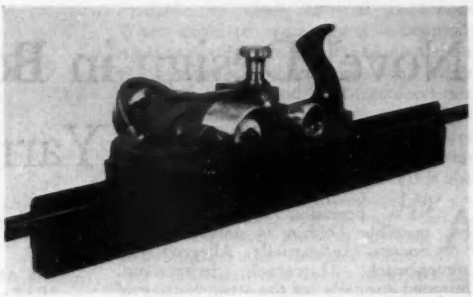
One aspect that has been revealed by preliminary costing estimates is that the process could well be of practical interest even for the small to medium sized tufted carpet manufacturers. Rate of printing is expected to be from 1 to 15 yds./min. This will largely be governed by the finishing equipment used in conjunction with the machine. Machines of 12-, 15- and 18-feed roller width are now being built for both British and overseas markets.

As tufted carpets are largely made with all viscose rayon piles, the work of B.T.M. has been largely devoted to solving the major problems of printing this type of carpet, but there is no obvious reason why tufted carpets made from other fibres—natural or man-made—and even blends, should not be printed with suitable recipes. B.T.M. are now able to offer manufacturers a complete range of printing equipment for one, two or more colours together with the necessary developing sections, drying ranges, etc. The new printing process is based on a principle that has been patented in all the main industrial countries, including Britain, U.S.A., Canada, Belgium, etc.

Overhead view of the delivery side of the broadloom carpet printing unit built by British Tufting Machinery Ltd., Blackburn

Air doctor along the roller of the new B.T.M. carpet printer





Squeegee Grinder has Micrometer Adjustment

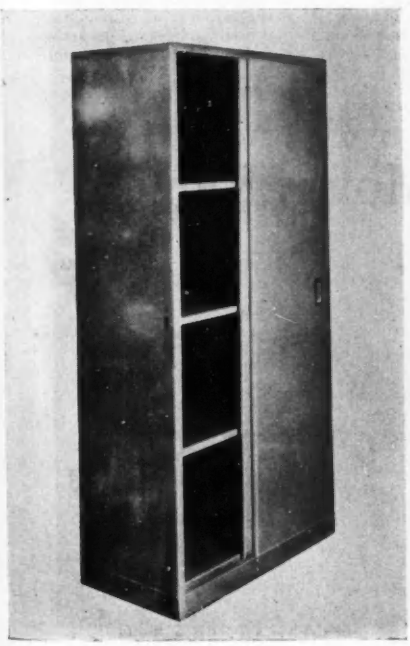
THIS new, beautifully designed, grinding tool for ensuring a true edge on the blades of screen printing squeegees is a recent addition to the range of equipment marketed by Wall and Co. (Bolton) Ltd., Bradford Buildings, Mawdsley Street, Bolton. Pointing out that it is an improvement on the original model, the company say it is much more versatile and can be used on any type of squeegee with all sorts of blading, and the shape of the edge produced can be varied simply by changing the wheel. The various shapes of wheel are specially made for elastomers, and are porous to allow grinding heat to escape.

The machine is very simple to operate and no special skill is required to produce a perfect printing edge. The squeegee is placed blade up in a vice, and the shoes of the tool are placed on the guide surfaces. Where there are no guide surfaces on the squeegee, steel rods are clamped into position, as shown on the photograph. The wheel is then lowered by the control knob until it just makes contact with the edge of the blade, and the grinder is moved slowly along in the manner of a wood plane. A hand adjustment graduated in thousandths of an inch, allows depth of cut to be regulated.

Space Saving Cabinets

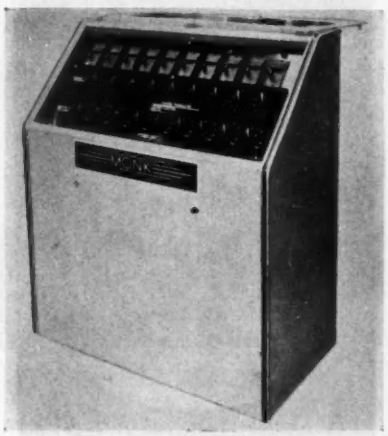
AS space in offices becomes increasingly important General Trade Equipment, 82-90 Seymour Place, London, W.1, announces a new line of sliding door cabinets. Because these cabinets have no swinging doors, up to three times as much space can be saved. These compact cabinets are therefore of particular value where space is precious.

Made of steel and finished in hammered green-stoved enamel, these lock-up units are supplied with two keys. They are available in a variety of sizes from the 40 ins. high by 36 ins. wide by 18 ins. deep model to the 72 ins. high by 48 ins. wide by 18 ins. deep model, and shelves can be ordered at prices varying slightly according to size.



Control Cabinet for Fashioned Knitting Machines

THE illustration shows a cabinet specially manufactured for S. A. Monk Ltd., Mansfield Road, Sutton-in-Ashfield, by Stonebridge Electrical Co. Ltd., 6 Queen Anne's Gate, London, S.W.1. This incorporates 10 predetermining counters, which are set up to enable the shape of knitted garments produced on a multi-head fully fashioned knitting machine, to be controlled automatically. These knitting machines with their control cabinets are exported to various countries throughout the world specialising in textile manufacture. Stonebridge Electrical Co. Ltd. specialise in the application of counters to various problems in automation.



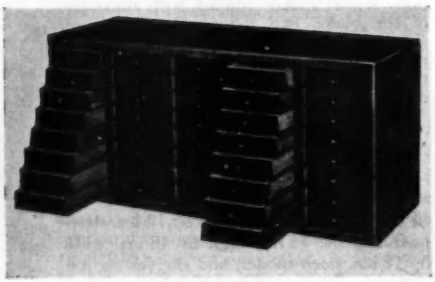
The new control panel on the right automatically controls the shape of garments knitted on a multi-head fully fashioned knitting machine

Novel Design in Bobbin for Setting Yarns

The Allegro retractable bobbin is composed of two elements:— cylindrical shell and support

A NEW precision engineered, contractible bobbin is announced by Societe Industrielle Allegro S.A. Emmenbrucke (Lucerne), Switzerland. Designed specially for the steam setting of synthetic yarn, the bobbin is constructed from two components; a stainless steel and alloy contractible cylindrical shell and a central support which acts as a pivot. When yarn is being wound on to the bobbin, the central support is fixed securely in the collapsible shell by means of a lock-nut. After winding, the nut is slackened and the support removed; the bobbin of yarn is now ready for setting.

The novel design of this noteworthy device allows automatically for any yarn shrinkage which takes place during steaming. As the yarn contracts the diameter of the bobbin decreases progressively in relation to yarn contraction. After steaming and unwinding, the bobbin returns to its previous diameter and is ready for use again. Economic advantages claimed, include a considerable overall saving due to the longevity and indistructability of the bobbin and the elimination of losses incurred when cardboard tubes are used.



Workshop Holdall

A COMPACT 40-drawer cabinet is now being marketed by General Trade Equipment Ltd., 82-90 Seymour Place, London, W.1. Excellent for storing drills, taps, dies, and other small parts it will help considerably in maintaining a tidy workshop and enable employees to find the article they want immediately.

Constructed throughout from sturdy $\frac{3}{4}$ in. solid parana pine, these drill chests are attractively stained and polished. The drawers measuring inside $8 \times 3\frac{1}{4} \times 1\frac{1}{8}$ ins. are made from beech with plywood bases and are fitted with black plastic handles.

The drill chests are manufactured in four sizes. The smallest with 18 drawers has overall measurements of $14 \times 9 \times 9$ ins. The largest (illustrated) with 40 drawers measures $23 \times 12 \times 9$ ins.

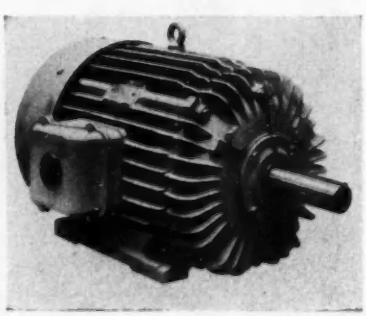
New Polythene Moulding

THE latest edition to the range of polythene bins and tanks manufactured by the "Engel" process and distributed by White, Child and Beney Ltd., Shepley Works, Audenshaw, Manchester, is a 35 gall. tub as illustrated. This is supplied complete with flush fitting lid, if required, and is moulded both in standard grade and high density (rigid) polythene. It may be fitted with inlet and outlet valves, if required, and steel holders, plastic handles, etc. are available. This addition brings the number of round and square sided polythene industrial mouldings up to 51 ranging in capacity from 10 to 300 gall.

Extension to Motor Range

ASSOCIATED ELECTRICAL INDUSTRIES LTD. announce that their range of new KN-D electric motors has been extended from $7\frac{1}{2}$ h.p. to 40 h.p. at 1,500 r.p.m. These totally-enclosed, fan-cooled machines, now available from stock, comply electrically with British Standard 2613:1957 and are dimensionally in accordance with draft British Standard (A(ele.)1629). This makes them interchangeable, rating for rating, with AEI drip-proof motors, Type KN-C, built in accordance with British Standard 2960:1958.

Type KN-D motors have Class "E" insulation with 65°C. temperature rise. The use of improved insulation has made it possible to offer a motor of smaller dimensions to replace the earlier machine with Class "A" insulation and 55°C. temperature rise.



New A.E.I. Type KN-D motor

Powerful Mobile Industrial Cleaner

THE need for a multi-purpose, powerful, but highly mobile industrial vacuum cleaner that can readily be used by female cleaning staff has long been recognised, and after considerable research into the practical aspects of industrial cleaning, the Kent Co. Inc. of New York have developed a machine specially designed to fulfil current industrial requirements. Known as the Jetstream, it is being manufactured in Britain by Kent Floor Machine Co. Ltd., Speke, Liverpool. Incorporating several unique functional design features, it is fast and manoeuvrable and can easily be used by women cleaners. Instantly adaptable for the wet or dry cleaning of walls and floors in entrance halls, corridors, workshops, offices, etc., it can also undertake a wide variety of other duties where a powerful and mobile suction unit is required.

A flexible hose and nozzle type unit has been adopted as standard on the Kent machine, enabling the operator to work independently of the machine which, being tricycle mounted with two fixed wheels and a front swivel ball bearing castor, follows behind as required, with considerable reduction in operator fatigue. Power is provided by newly-developed 1 h.p. by-pass universal motor working in conjunction with a three-stage fan system giving an air flow of 144 cu. ft/min. and a vacuum of 75 ins. (closed) or 51 ins. with a ¾ in. orifice at the end of a 10 ft. hose. A special wet shut-off device is incorporated.

In order to preserve the high performance rate over very long periods of continuous use, an exceptionally large filter surface area of 1,200 sq. ins. is provided, ingeniously contained in a relatively small area. For dry work the standard filter has a flannel cloth base; for wet work a new type of plastic-impregnated cloth is provided, and special filters are also available to meet unusual conditions. Where required—particularly in hospitals, nuclear research establishments, pharmaceutical laboratories, etc., where relatively aseptic and dust-free conditions are desirable—the Jetstream is fitted additionally with the Kent micro-impaction filter. Numerous industrial and medical tests have confirmed that this glass fibre filter, which was introduced last year in the Kent microstat vacuum machine, retains essentially 100% of particles down to submicron size. Retained waste—dry or wet—is housed in a 16 ins. diameter tank of 18-gauge seamless construction lined with Plastisol to resist acids, rust and detergents. The tank is mounted on ball bearing runners and is automatically separated from the machine by a simple hand lever, making disposal extremely easy and straightforward. Capacity is 1⅛ bushels (dry) or 10 galls.

Easy-to-Clean Conveyor

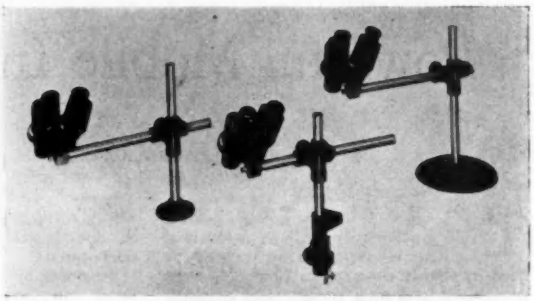
A FORM of quick belt release conveyor recently introduced by Farrow and Jackson Ltd., 41-2 Prescot Street, London, E.1, can be cleaned under the belt or on the skid plates without stopping the main drive. A quick release snubbing roller, with additional belt length, has been introduced, at the drive end and, by movement of the quick release handle, the snubbing roller can be moved to allow the additional belt length to become available on the line, thus allowing the belt to be lifted high on the carrying strand or the return strand to be pulled downwards, anywhere along its length for cleaning underneath and wiping down on the skid plates.

The conveyor illustrated is fitted with a double-faced white P.V.C. plastic belt (although other types can be supplied according to requirements) running over raised Dural skid plates ¼ in. thick. The complete guide rail system is formed of ¼ in. dia. stainless steel rails with removable and adjustable stops fitted across the lanes. The guide rails are supported from robust mild steel bridges straddling the conveyor, cadmium-plated and passivated, and having vertical adjustment above the belt. The complete guide rail system and bridges are made to hinge back through 90°, in sections, and remain in a vertical position at one side whilst cleaning takes place.

(left) The highly mobile Kent jetstream industrial stream industrial cleaner

The Farrow and Jackson easily cleaned conveyor with quick release snubbing roller device

Medium Power Binocular Magnifier

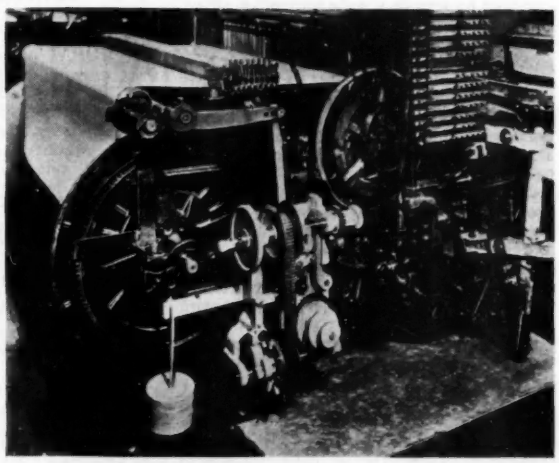


The new Allen mounting on three different bases

A NEW series of mountings are now available for use with the "Wray" binocular magnifier in which the use of a new type of optical system combines the following features: (*a*) magnification 100X area, (*b*) clear working distance 7 ins., (*c*) field of view—$\frac{1}{4}$ in. dia. circle, and (*d*) no special lighting required. This last advantage comes with the use of object lenses no less than $1\frac{1}{8}$ ins. dia. with their enormous light gathering power. The magnifier does not require stands incorporating rack and pinion vertical movements but needs stable and easily adjustable mountings suitable for the large working distance (7 ins.) and providing ample clearance for hands and arms when using tools.

The illustration shows the new "Allen" mounting on three different bases; a universal model with weighted base, a clamp model for desk or bench and a fixed position model. These mountings and bases are strongly made and finished in satin chrome and non-reflecting black ripple stove enamel. In addition to the three standard mountings, special models using a wide variety of bases including magnetic and floor stands, are being developed for special applications. Further particulars will be gladly supplied by P. W. Allen and Co., 253 Liverpool Road, London, N.1.

Features in Positive Let-Off Motion



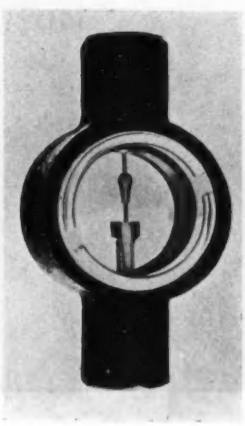
The Hunt let-off motion is shown here in position

WAVY cloth, one of the bugbears in weaving, can be caused by uneven delivery of warp threads from the beam. When, as is often the case, the warp itself is pulled, there is always the problem of slight variations in warp tension, and this is the most usual cause of wavy cloth. It is also a frequent cause of setting-on places which follow loom stoppages. A device designed to overcome this trouble in a simple and effective way is now available in the European market. Called the Hunt let-off motion, it is made and marketed by Casablancas High Draft Co. Ltd., Bolton Street, Salford 3. This motion actually drives the beam, and the mechanism is claimed to ensure that the beam turns just the right amount, whether full, nearly empty, or at any intermediate stage. The drive is completely positive, and because of the very wide range of speeds built in, it is possible to weave with it any conceivable fabric.

The Hunt let-off works directly from the warp tension itself, via a lever on the backrest which responds instantly to the slightest change in the tension. This means that the motion works correctly, regardless of the amount of warp on the beam, or of any other factor that could affect the warp tension. There are no feelers resting on the warp, and no readjustments are needed to allow for changes in warp tension—whatever their cause.

In use, the desired tension is obtained at the outset by means of weights, and after it has been set for a particular cloth, no further adjustment is required. The let-off continues to function without attention. This advantage is said to eliminate a very substantial amount of the total down time usually lost in making adjustments to the loom. Thanks to the extreme simplicity of the mechanism very little lubrication is needed, and maintenance requirements are practically nil. The Hunt let-off motion can be applied to any loom; only the type of mounting bracket varies, and the results are said to be uniformly excellent. It is suitable for weaving cotton, synthetics or worsted. Draper and Crompton and Knowles are fitting the let-off on their new looms in large quantities.

New Low Flow Indicator



A NEW addition has been made to the large range of flow indicators designed and produced by Liquid Systems Ltd., Holmethorpe Avenue, Redhill, Surrey. Known as the Model 180 it was primarily designed to give a positive indication of flow only when the flow-rate exceeded one-sixth of a pint per minute.

It can be modified to indicate other rates of flow and on receipt of the necessary information the indicator can be supplied set to the desired flow-rate. The illustration shows the indicator bead raised from the position in which it rests out of sight until the desired minimum flow rate lifts it into view.

THE TEXTILE
COLOURIST & FINISHER

Self-Smoothing Fabrics—Fibre and Fabric Recovery

Many authors have pointed out that the crease-recovery of fabrics is primarily associated with the inherent properties of the fibre. It has been shown, for example, that there is a simple linear relation between the crease-recovery of the fabric and the tensile recovery of the fibre from 3% extension

By J. T. MARSH

IN view of the very great interest displayed in the various manifestations of deformation and recovery of textile fabrics, it is useful to consider that the fibres in creased fabrics are bent to a greater or less degree. The act of bending produces a compression on the inner side of the bend and an extension on the outer side; this is shown in the comparison of a straight and bent viscose filament in Fig. 1 which is reproduced by courtesy of the Badische Anilin und Soda Fabrik from photographs by Reumuth. Fig. 2, from the same source, shows the bent fibre in polarised light.

Although it is obvious that some extension must occur, it cannot be very great in the creased fabric; this is demonstrated by the fact that ramie fibres do not fracture when the fabric is folded and their extension at break is generally about 3%. On the other hand, there is little information about the result of compressive forces on single fibres, but these are of minor consequence in crease-recovery. It has been shown very clearly by Elod, Holz, and Graeser (Reyon Zellwolle, 1955, **33**, 7) that the forces in the external zone of the bend are more effective; in other words, crease-recovery of the bent fibre is largely determined by elastic recovery from extension and not from compression.

From the well-known idealised diagram of the bent fibre shown in Fig. 3, it is possible to proceed to consideration of the fine structure in relation to extension. It is now generally accepted that the molecular chains of cellulose are arranged in two extreme methods which merge into one another through innumerable intermediate stages; on the one hand, chain molecules can come together in parallel array to form bundles or crystallites, and on the other hand, they may be in random arrangement in the so-called amorphous regions. The new terminology of high lateral order and poor lateral order does not alter the original conception.

Because of the high lateral order in the crystallites, the molecular chains are held together by hydrogen bonds, and although these are weak individually, yet they possess considerable strength when present in large numbers, as in cellulose. It must not be assumed, however, that there are no hydrogen bonds between the molecular chains in the amorphous regions; these are relatively few but they occur

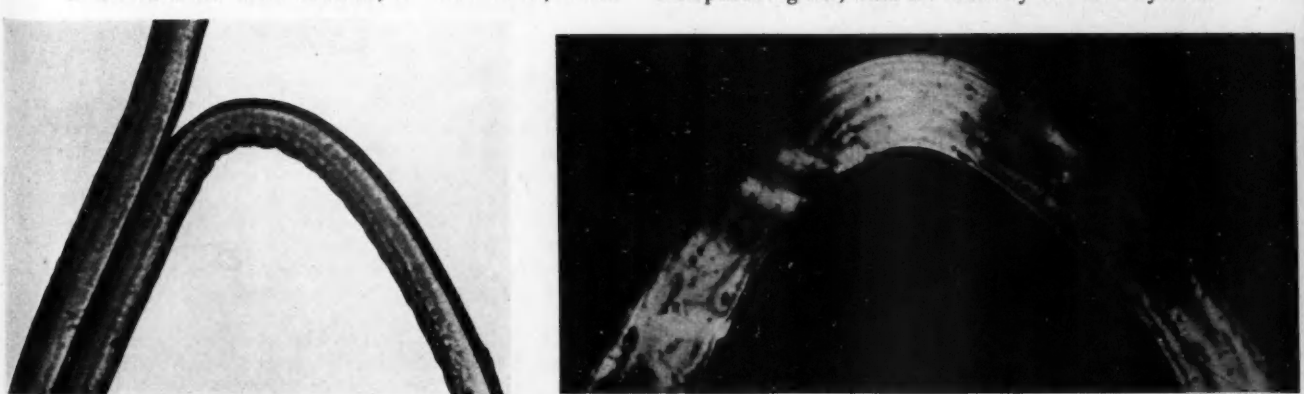
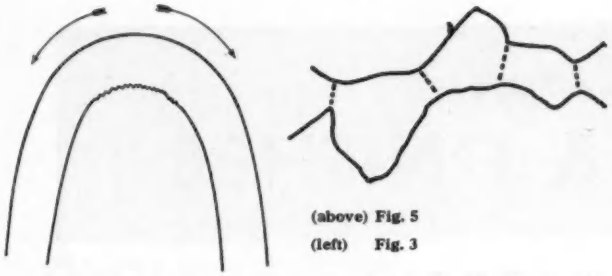


Fig. 1 (left). Comparison of a straight and bent viscose filament. Fig. 2 (right) shows the bent fibre in polarized light. (Photos by Reumuth, reproduced by courtesy of the Badische Anilin und Soda Fabrik)



(above) Fig. 5

(left) Fig. 3

to produce a network as represented in Fig. 4. Within the crystallites, the molecular chains are more or less straight, but within the amorphous regions they may take up various shapes and thus contribute to the flexibility of the fibre and also to the deformation and recovery as illustrated in Fig. 5.

Some part of the flexibility and elasticity of the fibre is due to the straightening of the crumpled chain molecules and their return to the crumpled state, provided the amount of extension is small. Extension and compression both occur in the amorphous regions where the hydrogen bonds are relatively few and far between; hence the molecular chains can move or slide on one another in the curve of the external bend of the creased fibre because the hydroxyl groups are normally lubricated by water (the moisture of condition) and the cellulose is plasticised. In certain circumstances, however, the amount of movement may be sufficient to overcome some of the hydrogen bonds in the amorphous region and these reform in new positions, as illustrated in Fig. 6, so that the chain molecules are deformed and this leads to creasing.

Elasticity of Fibres

Some useful comparisons of the elastic recovery from extension may be seen in the following table, taken from the work of Meredith (J.T.I., 1945, **36**, 147T).

Elastic Recovery of Fibres

	2% extn.	5% extn.
Cotton	74%	45%
Flax	65	—
Ramie	52	—
Viscose	82	52
Acetate	94	73
Silk	92	70
Nylon	100	98
Wool	99	89

It is also of interest to compare the elastic recovery from extension as shown above with the resilience of a fibrous mass as given by Rees (J.T.I., 1948, **39**, 131T).

	Resilience 2% extn.	Recovery 5% extn.
Cotton	38%	45%
Wool	56	89
Acetate	44	73
Silk	52	70
Nylon	53	98
Viscose	31	52

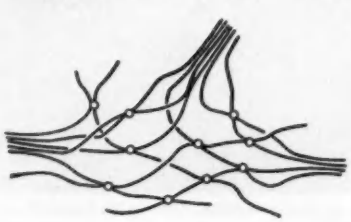


Fig. 4. Diagram of the network structure of cellulose with junction points in the amorphous regions, according to Hermans

From this data it is clear that there is good agreement between resilience and recovery from extension.

Another set of results may be seen in the work of Susich and Backer (Text. Res. J., 1951, **21**, 482) relating to the immediate elastic recovery of textile materials from 5% strain.

Immediate Elastic Recovery

Wool yarn	56%
Acetate multifil	54
Acetate staple	48
Cotton yarn 50/1	44
"Orlon"	42
Silk	41
Nylon	38
Polyester	38
Viscose multifil	37
Viscose staple	34
Cotton 12/1	32

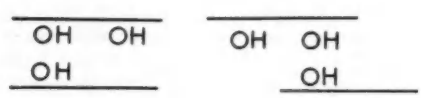
The following data relate to the elasticity index of various fibres according to the work of Hamburger, Platt and Morgan (Text. Res. J., 1952, **22**, 695).

Elasticity Index

	Deflection 1%	3%	5%
Silk	96%	77%	59%
Wool	83	73	57
"Terylene"	73	57	49
Nylon	59	49	42
Acetate	73	56	44
Viscose	50	30	21

Some useful information has also been provided by Beste and Hoffman (Text. Res. J., 1950, **20**, 441); they define tensile recovery as the extent to which the fibre returns to its original size, and work recovery as the proportion of the work of deformation which is returned. The details relating to 5% extension have been taken from their work and are shown in the following table.

	Tensile Recovery 60% R.H.	90% R.H.	Work Recovery 60% R.H.	90% R.H.
Silk	52%	58%	23%	24%
Wool	69	82	37	45
Nylon	89	90	55	64
Polyester	65	60	35	30
Viscose	32	28	11	10
Cotton	52	59	31	33
Acetate	46	37	18	14



(right) Fig. 6

Fibre and Fabric

Many authors have stated that the crease-recovery of fabrics is primarily associated with the inherent properties of the fibre; for example, it has been shown by Beste and Hoffman (Text. Res. J., 1950, **20**, 441) that there is a simple linear relation between the crease-recovery of the fabric and the tensile recovery of the fibre from 3% extension. In connection with the crease-recovery of fabrics, there is a widespread opinion that an angular recovery of 130° is advisable for adequate performance, but there are some so-called crease-resisting fabrics with a recovery as low as 120°.

In general, a typical cotton fabric may have a recovery of about 80 to 85° which is raised to 120 to 130° by the crease-resisting process; similarly viscose rayon with an initial recovery of 90 to 95° may often be finished to show

figures of 135 to 145°. Fabrics from the manufactured fibres sometimes show quite high angular recoveries, e.g. acetate rayon 125°, acrylonitrile 135°, and polyesters 105°. These may be compared with wool fabrics whose recovery is generally about 135 to 145°.

The above figures refer to the Monsanto method of testing which tends to give higher values than those from the Tootal method or the German method; the latter, according to Mieck (Dtsch. Textiltech., 1958, **8**, No. 8, 386) denotes a crease-free behaviour for angles of 160° and over, whereas figures of 130 - 160°, 90 - 130°, and below 90° denote low, moderate and high tendencies to crease, respectively.

It is clear that the crease-resisting cottons and rayons may be quite as good as wool at normal humidities, but the position in atmospheres of 90% R.H. is different. The early investigations of Speakman (J.T.I., 1927, **18**, 431T) into the elastic properties of wool showed that the absorption of moisture produced little change in resistance to deformation, so that when wool fabrics are wet they retain their appearance to a substantial degree. This, however, does not mean that wool may be creased at high humidities and that the creases will disappear if the fabric is dried in the creased state; it does mean, nevertheless, that creases imparted at high humidities will disappear naturally at high humidities. It is true that moist wool fabrics may distort more readily than when dry, but they also recover readily, provided they are only subjected to low loads.

The importance of the low load must be emphasised; this was confirmed by Harris and Brown (Test. Res. J., 1947, **17**, 323) who showed that the slope of the load-extension curves for wet and dry fibres is the same at loads of 0·2 grams per denier. The yield point of the wet fibre comes at the same extension as that of the dry fibre but at half the load; if the dry fibre is loaded beyond its yield point it does not fully recover, but the wet fibre is fully recoverable even if it is more readily distorted. A wool fabric may crease quite readily in a humid atmosphere and uncrease again under the movement of the wearer, but creases which are "dried-in" tend to remain, and this may be an advantage in some cases.

The effect of humidity on the angular recovery of fabrics has been examined by several workers; for example, some data have been provided by Gantz (Am. Dyes. Rep., 1952, **41**, 100) and his results refer to measurements made after 15 mins. of relaxation of the creased fabrics.

	Recovery Angles		
	65% R.H.	95% R.H.	Change
Cotton (CR) ..	143°	97°	32%
Linen (CR) ..	118	56	52
Viscose (CR) ..	144	85	41
Wool	144	101	30
Acrylonitrile ..	138	137	1
Polyester	157	155	1

The above measurements were made on the Monsanto machine but there are also some results obtained by Coplan on the Cyanamid roller test machine (see Kaswell; Textile Fibres, Yarns and Fabrics; Reinhold Corp.; New York; 1953; page 274).

	Recovery Angles		
	65% R.H.	90% R.H.	Change
Spun viscose, untreated	91°	39°	—57%
Spun viscose, treated ..	140	92	—34
Worsted suiting ..	141	127	—10
Polyester suiting ..	131	133	+1·5
Polyester/wool 55:45 ..	139	134	—3·5

From these and other data it seems reasonable to expect that any fibre with a good recovery and low regain at 65% R.H. would have a good crease-recovery at all humidities likely to be encountered. Since 1953 or so, however, there has been increasing interest in the so-called non-iron effect which entails a high degree of recovery from creasing in the wet state, so that the conventional treatments had to meet a new set of requirements. With many of the treated cotton goods, the wet recovery is often as high as 90% of the dry recovery, but with rayon the figure is generally about 66%; this may be associated with the difference in crystallinity of the two fibres and the accessibility of the hydroxyl groups to water. The crease-resisting effect probably depends on some form of entanglement or cross-linkage of the chain-molecules of cellulose and includes both resin-bonds and hydrogen bonds; many of the latter are broken on wetting as shown in Fig. 7, so that one would expect the recovery in the wet state to be lower than the dry recovery.

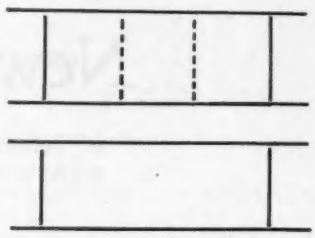


Fig. 7

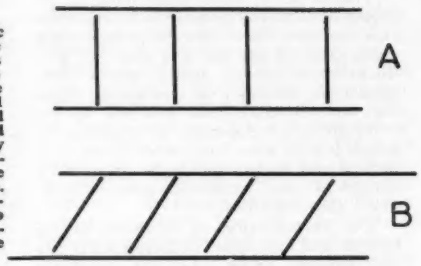


Fig. 8
Simple diagrammatic representation of the effect of cross-links or entanglements (*A*) which hinder the flow of the structural units when strained or deformed (*B*) and store up the energy to provide crease-recovery (compare the self-closing door). The same entanglements will also reduce the extensibility of the fibre

In the autumn of 1958, considerable publicity was given to products which possessed recovery from creasing in the wet state only; one example of this effect is the Belfast finish. This property was first observed by Wood in 1921 as a result of experiments on swollen cotton with either monofunctional or bifunctional reagents; later work by Hunt and Marsh in 1950 demonstrated the possibility of wet recovery by swelling or disorganisation of the structure of cellulose without the formation of a chemical derivative (B.P. 727,882; 727,889 - 90). It is possible that these effects depend on the production of a fibre which is more or less isotropic, and results in a fabric which expands on wetting to give a self-straightening or self-smoothing effect.

The chemical treatments have a common feature in that they all take place on the swollen fibre which remains more or less expanded; the fundamental difference between treatments of swollen cellulose and collapsed cellulose with formaldehyde has been clearly demonstrated by Wood (J.S.C.I., 1931, **50**, 411).

One of the remarkable features of fabrics with wet recovery only is that they possess no dry recovery even when the reaction is extended to give a high degree of cross-linkage; indeed, the dry crease-recovery is often lower than that of the untreated cotton. This has certain repercussions, for fabrics with wet recovery only cannot be tumble-dried with satisfaction and need line-drying.

In the conventional crease-resisting product where the final treatment takes place with a collapsed fibre, there are

(*continued on page 207*)

New Finishes in Textiles*

A review of some recent developments in wash and wear properties, permanent creasing, flame and moth-proofing techniques, etc.

By C. S. WHEWELL†

TEXTILE finishing is in a particularly interesting phase. Developments in the man-made fibres industry have yielded fibres with new and exciting properties and this has stimulated research into the improvement and modification of both natural fibres and the older types of rayon. On the other hand certain unique properties of the natural fibres give them definite and commercially significant advantages over the man-made fibres. Consequently, research in the yarn and fabric finishing industry is at the same time aimed at giving man-made fibres the more desirable properties of the natural fibres, and at endowing natural fibres with some of the properties of certain man-made fibres.

Thermoplastic man-made fibres of low regain have played a particularly important role, for these fibres have properties which made possible for the first time the production of fabrics which retain their appearance during wear and during washing and drying. This has led to the commercial development of processes by which fabrics made from other fibres, both natural and man-made can be given these smooth drying, "minimum-care," "drip-dry," characteristics.

The introduction of smooth drying fabrics was received enthusiastically by the general public for the laborious operation of ironing is becoming increasingly less attractive to the modern housewife. With the growing popularity of washing machines, spin driers and tumbler driers there is little doubt that in the very near future there will be an increasing demand for fabrics which retain their appearance during wear and which can be washed in a domestic washing machine and tumbler dried and which do not require ironing.

To meet these requirements research on topics such as fabric stability, the felting of wool, factors affecting the swelling and moisture absorbing characteristics of fibres has become increasingly important and the commercial outcome of many of these apparently academic investigations has been most encouraging. Finishing research has also been directed towards minimising the undesirable characteristics of textile fibres; the promoter of each type of raw material is anxious to increase sales, and it is, therefore, desirable to improve fabrics in every possible way.

Finally mention must be made of the ever-increasing competition within the textile industry. Although cloths are sold essentially on their intrinsic worth, publicity and advertising play a very important role in modern selling. The production of a new style or a new finish often serves a double purpose. If successful, it is a new source of income, for often there is the greatest financial return on new lines; but in addition it is a demonstration of the initiative and enterprise of the firm and this attracts business in standard lines. New finishes have an increasing high prestige value. Many of them may be derogatorily termed "gimmick"—often by competitors—but generally they are demonstrations of new ideas or the ingeneous application of old ones.

Production of standard lines should be as efficient as possible. This demands constant attention and research. Only by this means is one able to take advantage of the latest developments in the field of chemical technology and to keep the plant at the most effective level.

Wash and Wear Fabrics

The production of wash and wear fabrics is the concern of almost all textile manufacturers. According to J. L. Barach the best current definition of a wash and wear fabric is "A wash and wear fabric is one that can be made into a garment that will satisfactorily retain its original neat appearance after repeated wear and laundering with occasional or no ironing." It is important to note that in this definition emphasis is placed on the garment rather than the fabric.

To design the best wash and wear fabrics careful attention should be given to the choice of fibre, yarn and cloth structure, dyes and finishing technique. By this means fabrics of outstanding performance may be obtained. In general they contain considerable amounts of hydrophobic fibres so that their regain is low; blended with other fibres to obtain a particular handle or appearance. A list of component materials suitable for use in wash and wear apparel is given in Table 1 due to J. M. Perry.†

TABLE 1

End-use		Description
Suitings	Linings	Properly constructed and heat set 70 den. nylon taffeta fabric.
	Coat canvassing	Fabrics of "Dacron" polyester fibre and goat hair, 250 den. "Dacron" or goat hair.
	Zips	Zips with tapes of nylon or "Dacron."
	Collar canvasses	Properly heat set taffeta fabrics of 250 den. "Dacron."
	Shoulder pads and sleeve heads	Nylon batting covered with marquisette of nylon or "Dacron."
	Wiggins, stays, and tapes	Loosely woven taffeta of "Dacron" or nylon.
	Labels	Woven labels of 100% "Dacron" or other fabrics meeting cutters' specifications can be used. Labels should be colourfast to washing.
	Piping	Bias cut tape of 70 den. nylon.
Trousers and slacks	Waist bands	70 den. nylon taffeta over a 250 den. taffeta of "Dacron" polyester fibre.
	Pocketings	Properly heat set 70 den. nylon taffeta or woven fabric of 65% "Dacron," 35% rayon.
	Zips	Zips and tapes of nylon or "Dacron."
Skirts	Waistband interlining	Taffeta of 250 den. "Dacron."
	Hem binding	Tapes of nylon or "Dacron."
	Zips	Zips with tapes of nylon or "Dacron."
Dresses	Shoulder pads	Nylon batting covered with marquisette of nylon or "Dacron."
	Zips	Zips with tapes of nylon or "Dacron."
	Hem bindings	Tapes of nylon or "Dacron."
Rainwear	Linings	Properly heat set 70 den. nylon taffeta.
	Interliner	Self-lined or taffeta of 250 den. "Dacron."
Jackets	Linings	For fleece-lined jackets, knitted fleeces of nylon or "Orlon" acrylic fibre. For quilted linings, nylon taffeta lined with a batting material of "Dacron" fibre or nylon.
	Zips	Zips with tapes of nylon or "Dacron."

In general, however, the problem presented to finishers is that of producing wash and wear fabrics made from fibres which absorb considerable amounts of moisture and which are desirable because of their unique characteristics or their low price. Extremely successful results have been attained with cotton and rayon fabrics and now wash and wear wool fabrics have appeared on the market.

Wash and wear cellulosic fabrics are based on treatments involving the use of resins or cross linking agents. The general effect is to alter the moisture absorption characteristics of the fibre, and to improve resistance to creasing, and to make the fabric dimensionally stable. The resins most commonly used are those based on urea-formaldehyde or melamine-formaldehyde. Fabrics are padded with a mixture of a resin precondensate and a catalyst, then dried and finally baked. The precise formulations vary considerably but usually consist of a thermosetting resin precondensate, a catalyst, a softener, and perhaps an optical bleach. Resin is formed

* *A paper given recently to Leicester Textile Society and Guild of Technical Dyers, Leicester.*

† *Professor of Textile Technology, University of Leeds*

† *Man-Made Fibres Encyclopedia Interscience Publishers, London,* 1959.

in the fibre during the curing and excess reagents, incompletely formed resin, and surface resin are removed by a wash in soap or detergent solution. Two theories have been put forward to explain the effectiveness of this treatment. In one the penetration of the resin polymers into the amorphous regions of the cellulose is considered to be the important feature of the reaction while in the other cross-linking between the cellulose chains is stressed.

When urea-formaldehyde resins are used the ratio of formaldehyde to urea varies between 1 : 6 and 1 : 3. Often the precondensate is made by the finisher himself, but if it is to be marketed it is reacted with methanol to yield a more stable product. Similarly, melamine-formaldehyde precondensates are reacted to methanol to yield methoxy methyl derivatives of melamine.

Both urea-formaldehyde and melamine-formaldehyde yield satisfactory wash and wear fabrics but recently great attention has been focussed on the fact that the treated materials absorb chlorine when laundered in presence of bleach (sodium hypochlorite). When the materials are then ironed or heated the chlorine is split off as hydrochloric acid and causes degradation. Moreover, chlorination of melamine-formaldehyde resins causes them to turn yellow. The reactions involved are as follows:—

$$\rangle NH + HOCl \rightarrow \rangle NCl + H_2O \text{ ----- (1)}$$

$$\rangle NCl + H_2O \rightarrow \rangle NH + HCl + O \text{ ----- (2)}$$

The damaging effect may be reduced by using a high proportion of formaldehyde in the precondensate and by choosing an appropriate catalyst (e.g., magnesium chloride or zinc nitrate), but in no case is it eliminated. Efforts to minimise this effect have led to the development of other stabilising finishes, some in which the active compound contains substituted nitrogen which is not so reactive with hypochlorites and others which are free from nitrogen. The most common reagent is dimethylol cyclic ethylene urea (Calaroc EU) of formula (I). This substance does not yield a cross-linked resin but may give a short chain linear polymer. It is more conveniently classified as a cross-linking agent as shown in equation (1).

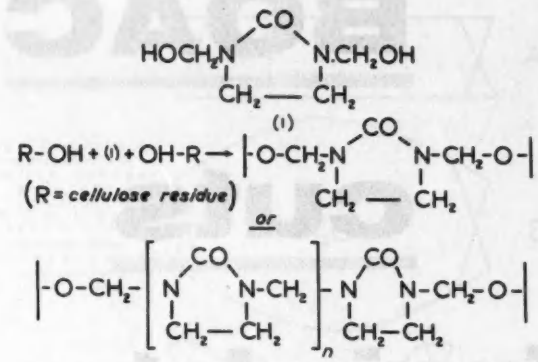
The treated cloth has comparatively little chlorine retention but it is claimed that the finish is "loosened-up" by repeated washing.

Closely related to these compounds are the triazones (II) in which the basic tertiary nitrogen buffers the acid which may be released if chlorine is absorbed. The triazones are the basis of the Mykon Resin C-U (Warwick Chemical Co.).

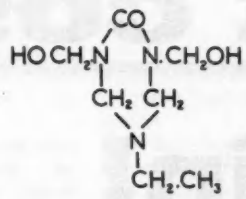
Completely chlorine-free finishes can be based on the use of formaldehyde, glyoxal, acetals, e.g., compound III, and epoxy compounds (IV), e.g., Epikote 812 (Shell).

It is unfortunate that high wet and dry crease resistance seem to be difficult to obtain at the same time. Most of the finishes mentioned above tend to yield good dry crease resistance and moderate wet crease resistance. If high wet crease resistance is required treatment with dichloropropanol (V) under alkaline conditions is recommended, or alternative with formaldehyde in presence of concentrated solutions of sulphuric acid.

Equation (1)



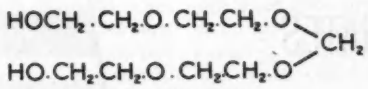
(2)



In all these treatments careful control of processing is essential if the best results are to be obtained. Composition of padding liquors, temperatures of drying and curing and preparation of fabric must be rigidly standardised. In this connection it is important to note the great advances which are being made in fabric desizing and preparation, particularly in the use of sodium chlorite, hydrogen peroxide, and boiling halogenated hydrocarbons.

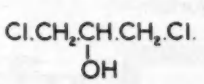
(Below 3)

Right (4)



diethylene glycol acetal.

(5)

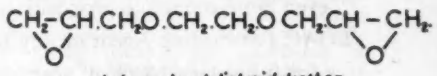


The production of wash and wear wool fabrics presents many more problems and is still in its infancy. According to Farnworth the fabric must have acceptable strength, handle, colour fastness, wear resistance, dimensional stability, stability of creases and pleats in wear and washing, and it should retain its appearance during wear and after washing. Stitchings, trimmings, linings in garments should be carefully selected to avoid gross distortion.

The commercial production of such fabrics has developed from the work on shrinkproofing wool and the production of permanent creases and pleats in wool, for clearly wash and wear wool fabrics will require a finishing treatment which includes relaxation (to minimum relaxation shrinkage), an anti-felting treatment, a stabilising treatment, i.e., setting the cloth in the flat, relaxed state. Many shrinkproofing treatments are available, e.g., the permanganate hypochlorite treatment and the permonosulphuric acid-sodium bisulphite process of Stevensons, Ambergate, the many controlled chlorination processes, e.g., the Melafix process (Ciba), the peracetic acid-hypochlorite process of the W.I.R.A., the Tootal alkali process, a new process by the C.S.I.R.O., involving treatment with potassium permanganate in concentrated salt solutions followed by cleaning with sodium bisulphite.

Although both ammonium thioglycollate and sodium bisulphite have been used for introducing permanent creases and pleats, sodium bisulphite is recommended for non-iron finish. The fabric is treated in a 1% solution of the reagent (uptake 50% on conditioned weight) and then blown for 3–5 mins. on a blowing machine operating on 60 p.s.i. steam. Cloths finished in this way show considerable promise. Closely related to these fabrics are those which can be permanently pleated by the tailor and which retain their creases. They are given the Immacula finish—which involves treatment with bisulphite and subsequent finishing under carefully controlled conditions.

Polymer finishing is not limited to wash-wear and anti-crease effects. Polymers



ethylene glycol diglycidyl ether

have made possible the fixation of phosphorus on cellulose as in the Proban process for fireproofing. The need for fireproofing cellulosic textiles has long been recognised but it is only recently that effective durable treatments have been developed. Three processes are well established. In that developed by Associated Lead Manufacturers Ltd., working in association with Horrockses, Crewdson and Co. Ltd., compounds of antimony are applied along with resin-forming substances, while Peter Spence and Sons Ltd. have developed a process in which compounds of antimony and titanium are applied to the fabric so as to precipitate insoluble oxides inside the fibres. In the Proban process phosphorus containing resins are formed in the fibre. The fabric is padded with a solution containing T.H.P.C., triethanolamine, trimethylol melamine and urea, then dried at 85°C. and finally baked after which it is washed first in cold water and then in hot detergent, rinsed and dried. The material is flameproof and shows some drip-dry characteristics.

(*continued on page* 207)

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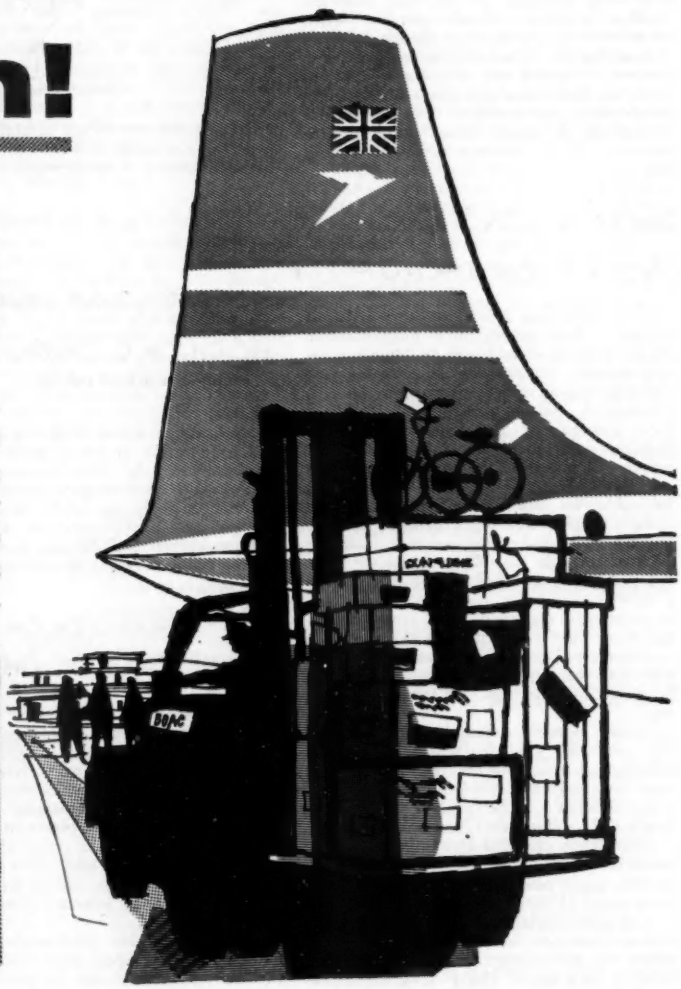

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Self-Smoothing Fabrics

(*continued from page 204*)

entanglements or cross-linkages caused by the amino-aldehyde condensation product and the hydrogen bonds between the chain molecules in the amorphous regions. When the fabric is creased or distorted, some of the force of deformation is thrown upon these linkages and so establishes a recovery mechanism not unlike that of the self-closing door; a simple diagrammatic illustration is shown in Fig. 8. It is possible to explain the whole behaviour on the basis of hydrogen bonding between the hydroxyl groups of the cellulose, and also between the resins or other suitable compounds and some of the cellulose-hydroxyl groups, in such a manner that these hydroxyl groups are inaccessible, and hence the molecular chains are prevented from slipping or moving very far on one another. Similarly, as brittleness is generally attributed to a high degree of crystallinity with a large number of hydrogen bonds, any increase in hydrogen bonding might be expected to bring about some embrittlement.

In the wet-recovery processes, on the other hand, the treatment takes place on a highly swollen fibre; the hydrogen bonds are disrupted and the molecular chains forced apart by the swelling agent. This means that the distribution of the chemical bonds will be different from that present in the collapsed fibre, and will probably be much nearer to the crystallite; reagents such as dichlor-propanol or epichlorhydrin are not telescopic and can only bridge those distances where the chains of cellulose are sufficiently close to permit reaction. Hence when the fabric is dried, it possesses less hydrogen bonds than the conventional crease-resisting product and a lower dry recovery as illustrated in Fig. 9. The wet-recovery product often has a lower dry recovery than the untreated cotton, and this is probably due to the presence of the new linkages bringing

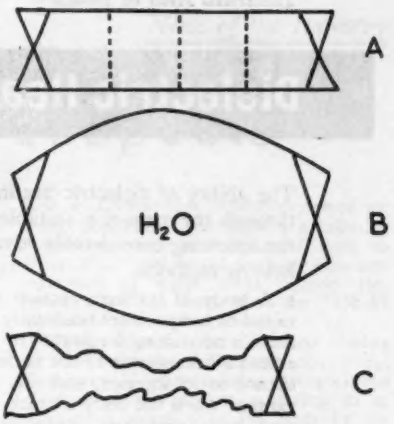


Fig. 9. Diagrammatic representations of—
(A) Dry crease-recovery of collapsed fibre
(B) Wet crease-recovery of swollen fibre
(C) Absence of crease-recovery of (B) when dry

about an expanded structure which prevents the formation of those hydrogen bonds normally present in untreated cotton.

Reduction of hydrogen bonds and a different distribution of chemical bonds results in a distended structure which also seems to be a disrupted structure; tensile strength is diminished. This is a real and irrecoverable loss, for many of the treated fabrics have given rise to complaints. On the other hand, the conventional modern treatment of the collapsed fibre gives a product whose strength losses are recoverable and after about twenty washes the tensile strength may be higher than that of untreated cottons subjected to similar washing treatments. The treated cotton possesses good dry recovery and wet recovery because there is no loss in hydrogen bonding; on the contrary, hydrogen bonding is increased and supplemented by bonds from the amino-aldehyde products with a very satisfactory distribution producing the desired effect.

New Finishes in Textiles

(*continued from page 206*)

Since bromine can act as a chain stopper in flaming reactions a mixture of triallyl phosphate and bromoform has also been used for fireproofing and the combined T.H.P.C. - B.A.P. finish is claimed to be an improvement on the straight T.H.P.C. finish. It is, of course, more expensive. Recently a finish has been developed based on trisaziridinylphosphine oxide (A.P.O.) and T.H.P.C. which react to form highly cross-linked polymers. The cloth is padded with a mixture of equimolecular quantities of A.P.O. and T.H.P.C. containing triethanolamine, dried at 90°C. and baked at 140°C. for 5 mins.

Of new finishes applied to wool, mention must be made of the growing importance of Dielmoth for mothproofing wool, and of bacteria-static treatments involving reagents like haxachlorophene, o'-phenyl phenol or quatenary compounds and new work on the bleaching of pigmented fibres. The bacteria-static finishes are perhaps the most significant at present. There is a growing interest in the prevention of offensive odours developing in garments. These arise from the activities of bacteria and can therefore be prevented by the use of bacteriacides. Such finishes are well established in the U.S.A. and are likely to become popular here. They are particularly important in the treatment of hospital blankets and effective processes based on compounds such as Cetavalon or Sapamine have been developed.

In conclusion the importance of applying conventional processes to new materials must be stressed. Of particular significance is the effect of schreinering on nylon tricot. When treated as described by D. Hardisty, the fabrics become less transparent and take on a more attractive handle. Of great significance also is the possibility of obtaining improved cover by the use of blends of stable and unstable fibres in fabrics. This technique has been exploited particularly effectively in cloths containing acrylics. When these fabrics are scoured in the usual way, the dimensionally unstable yarns contract and thereby cause the stable to bulk. This greatly improves the cover on the fabric. To obtain the best results considerable care is necessary. Creases must be avoided in the relaxing process or these will be made permanent. It is good practice to take many of the precautions which have been found necessary in successful crepe finishing, particularly in respect of ensuring that the material is relaxed while in a complete free state.

MALEIC ANHYDRIDE. Monsanto Chemicals Ltd., Monsanto House, Victoria Street, London, S.W.1. Maleic anhydride is highly reactive and contributes to products ranging from oil additives to pharmaceuticals. Its chief value lies in the readiness with which it forms resins and takes part in organic reaction, and it has a marked ability to take part in both condensation and addition polymerisation before or after esterification. A new booklet issued recently, specifies and briefly describes several applications of this useful and versatile chemical compound.

• • •

ALUMINIUM CASTING ALLOYS. Association of Light Alloy Refiners and Smelters Ltd., 3 Albemarle Street, London, W.1. A revised edition of the company's mounted data sheet is now available to replace the 1955 issue. The amendments concern mainly the related specifications section and are the result of the revision of the B.S. "L" Series of Aircraft Standards and the transference of four D.T.D. specifications to the B.S. "L" series. One of these, the familiar D.T.D. 424A, will in future be known as B.S. L79. The B.S. 1490 "LM" numbers remain unchanged. Readers can obtain copies free of charge.

Dielectric Heating - 2

The ability of dielectric heating to generate heat through the mass of a suitable material provides the following considerable advantages over other heating methods.

1 A body of uniform section and composition is raised in temperature uniformly throughout. Hence there is no waiting for heat to be transferred from an external heat source to the surface of the body and thence to its interior, and this is of particular advantage when the body is thick, and, as is often the case with dielectric materials, has poor heat-conducting properties.

2 The rate of heating of such bodies is, therefore, much faster than by external heating methods.

3 Since there is no external heat source, overheating or burning of the surface of a heat-sensitive material is avoided.

4 High thermal efficiency is achieved.

5 The amount of heat generated in the work is usually predictable and power input and heating time can be under positive control.

6 Production can start immediately after switching on and no current is used, nor heat lost, during periods of shut-down.

7 Vastly increased productivity is obtainable with less labour (usually unskilled), and fewer machines and less floor space are required.

8 Flexibility of layout makes it possible to plan the factory to best advantage, as dielectric heating equipment can usually be inserted directly into the production line.

Dielectric heating: typical application data

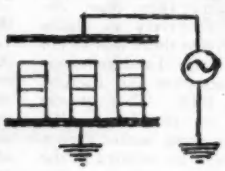
Typical application	Frequency	Radio frequency power
Thermoplastic welding.	20-100 Mc.p.s.	Up to 1 kW
Plastic pre-heating, wood glueing.	10-40 Mc.p.s.	2-30 kW
Plywood manufacture.	2-10 Mc.p.s.	Above 30 kW

Note: 1 Mc.p.s. = 1,000,000 cycles per second.

A few of the industrial applications of dielectric heating are briefly described below.

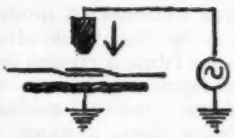
Preheating Thermosetting Plastics

Dielectric heating is the ideal way of preheating moulding powder pellets used in the production of thermosetting plastic mouldings, since these materials are generally poor heat conductors. Properly applied, dielectric preheating promotes faster curing and hence a shorter moulding time, often increasing production ten to fifteen times. There is a marked reduction in tool wear, and thicker sections can be moulded, as the material is plastic when placed in the mould. There is less damage to, and movement of, metal inserts.

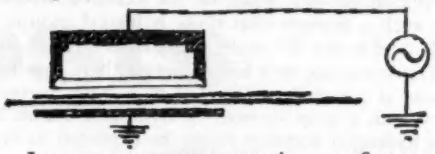


Welding of Thermoplastic Materials

An important and extensive application of dielectric heating in the plastic industry is the welding of thermoplastic sheets in the fabrication of such commonly used articles as raincoats, hoods, handbags, pouches and packaging materials. Dielectric heating is the only method which can usefully be employed since the heating electrodes, and hence the outside sheet surfaces remain cool while the inside surfaces forming the joint are fused, and a perfect weld results.



Two or more thermoplastic sheets are welded under pressure from electrodes suitably shaped to the area of weld required, the current being switched on at the same time as pressure is applied, and off as soon as the weld is completed and the pressure released. Stitching is thus eliminated and a far stronger joint achieved.



In most cases, component pieces are first cut from patterns and preliminary welding carried out to attach any fastening tabs and the like. The pieces are then brought together in a suitable loading frame and the main welding carried out to produce the complete article. In some cases, a suitably profiled electrode can be fitted with a knife edge to cut the sheets immediately outside the weld line, welding and pattern cutting being thereby carried out in the one operation. Dielectric welding can be applied also to very large thermoplastic products such as linings for swimming pools, and cinema screens.

Drying

Drying of materials by dielectric heating has the great advantage that the material tends to dry out from the centre, the reverse of what happens when external heating methods are employed, and the risk of overdrying and overheating of the surface is eliminated. In general ½ to 1 unit of electricity is required to drive off 1 lb. of moisture, depending upon the thermal properties of the material being dried. While the removal of large amounts of water from inexpensive commodities may sometimes be uneconomical, dielectric heating in the production line often leads to a higher overall production efficiency. It is valuable for removing final moisture traces and becomes increasingly economical as the value or heat-sensitivity of the commodity increases.

Rubber

External heating tends to dry and cure the surfaces of a thick latex mass before its centre, but dielectric heating properly applied promotes uniform conditions throughout.

Loaded rubber may not heat uniformly in a dielectric field due to uneven dispersion of its load, but nevertheless rubber preforms loaded up to about 15% are preheated dielectrically to reduce moulding times appreciably, the temperature evening out in the mould to give uniform curing.

Further examples are given in Data Sheet No. 12.

For further information get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available — "Induction and Dielectric Heating" is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity. Ask for a catalogue

6774

Textile Trade and Prospects

Linen Trade Review

The Budget proposals have done little to stimulate demand in the industry, beyond releasing business purposely held back in anticipation of changes in the economic pattern which might have favoured the buyer. With order books well filled and machinery cover well into the summer manufacturers have not been unduly concerned regarding the decline in inquiries in recent weeks and in the volume of business placed. All sections are moderate busy and an undertone of optimism prevails in the yarn and cloth markets.

There is little reliable information to hand yet regarding raw material prospects from the 1960 crop. Judging from the demand for sowing seed it seems evident that the N. Ireland Ministry of Agriculture price guarantee for flax grown from the 1960 crop has failed to attract growers. This was considered likely by the trade, as, being on the same level as that for the 1958 crop, it failed to provide for the substantial advance in production costs in the interim. However disappointing to the prospective producer and user it has to be admitted that the guaranteed rates offered are substantially higher than those for comparable qualities in world markets.

While it is freely admitted that a substantial production of home grown fibre, equal to at least 25% of the industry's total requirements, is essential to the economic wellbeing of the trade in Britain, there is little prospect of this being achieved under the current planning programme. A new approach to the problem is necessary, and this will call for closer co-operation between producer and user, with willingness by all to break with tradition where this seems to be desirable.

Favourable weather conditions have ensured a good start to the crop in France and the Low Countries. No official statistics are to hand yet regarding the areas sown, but preliminary figures indicate a definite increase in France.

Although the substantial drop in 1959 crop acreage on the Continent was responsible for boosting prices in anticipation of a fibre shortage this did not actually occur despite the considerable expansion in output of linen end products, and manufacturers are less concerned regarding the quantity of raw material from the 1960 crop than with the probable quality. The progressive downward trend of this is contrary to the needs of the industry, particularly the British section, which is increasingly concerned in the manufacture of high class products. Also, the economic operation of modern high speed and automatic equipment is dependent on a reserve of quality in the raw material used. A sufficient margin is seldom obtainable to cover requirements for fine yarn numbers, for which old type spinning equipment must consequently still be used, with increased responsibility on the labour force to offset raw material short comings.

Flax transactions in West European flax markets in recent weeks have been on a reduced scale, with little interest shown by buyer or seller. Any material on offer has been mostly in the lower grades while buyers' interest is centred mainly on the medium and better qualities. Offers were not high enough to bring out any of the latter material—if such is available—which is doubtful.

Merchants and composite houses report that the inquiries received and business placed cover the normal range of output with emphasis on dress goods, damasks and handkerchiefs. Consumer interest at home and overseas has been sustained by the excellent publicity campaign conducted by the Linen Guild. Recent results indicate that the appointment of a Director of Publicity has been effective in channelling the Guild's activities, and is paying the industry a handsome dividend on its investment in Guild funds.

The new London offices of the Irish Linen Guild were opened on March 23 by the N. Ireland Minister of Commerce, Lord Glentoran. The chairman, Mr. J. M. Gray, M.B.E., who presided, said that the Irish Linen Guild believed that the future prosperity of the industry lay in devoting greater attention to the home market in the U.K. This was free from tariffs, currency, import and other restrictions, and provided room for expansion following enforced neglect during the war and immediate post-war years. He emphasised the fact that linen still remained a craft industry depending to a great extent on the skills of its workers.

This poses a fundamental question in re-equipment—the extent to which modern machinery can be economically employed in meeting the needs of an industry which must depend in increasing measure on diversification of end product and on the skills of its operatives. It is obvious that re-equipment plans must be based on a preliminary survey of long term market trends.

Wool Production and Consumption

Raw wool production in the free world in the 1959-60 season is estimated at just under 4,500 million lbs. (greasy), or about 3½% more than the previous season's total of 4,340 million lbs. This new figure is about 75 million lbs. greater than the preliminary estimate of last September, because Australian and Argentine clips are likely to be somewhat larger than originally forcast, though the South African clip will be smaller, states the Commonwealth Economic Committee. Damage to Argentine flocks by last year's serious floods is not so great as was feared, and higher production in the south has more than off-set flood losses in the north-east of the country. Uruguayan wool production has also suffered from floods, and the quality is stated to be below average. Substantial rise in the U.K. clip is expected. Provisional estimates of production in Communist countries, based on sheep population data show a continuing further increase amounting in total to about 8%. Total world production is now estimated at some 5,585 million lbs. (greasy), or 4% more than the 1958-59 figure of 5,350 million lbs.

World exports of wool tops during 1952-59 rose by 65% with the U.K., France and Uruguay holding their positions as three chief suppliers, according to an eight-year survey of world trade by the Commonwealth Economic Committee. Between 1952 and 1958, the U.K.—the largest exporter of tops—increased its share of the trade from 37 to 44%, but it fell to 40% in 1959 although U.K. exports that year were the biggest ever. France's share declined over the eight years from 27 to 23%, but Australia's proportion rose fairly steadily, reaching 9% in 1959. Aggregate woollen and worsted yarn exports more than doubled during the period, but the U.K. share fell from one-third to under one-fifth, while that of France—the largest exporter since 1953—rose from 27 to 30%. The proportion held by Belgium—now second largest supplier—has remained stable around one-fifth. Both Japan and Italy increased their shares of the trade markedly during the eight years, though their exports remain relatively small. Total wool cloth exports rose by about three-quarters from 1952 to 1959. Although comparative figures are less complete than those for tops and yarns, available data shows that the U.K. share of the total has fallen sharply, together with that of France and the Netherlands, while the shares of Italy, Japan and Belgium have risen substantially.

Australia's wool clip this year may exceed the earlier forecast of about 1,690 million lbs., which was 100 million lbs. or about 6% more than last year's record clip. Mr. J. S. Gale, president of the National Council of Wool Selling Brokers, recently said in Sydney that current production indicated that the clip forecast would be achieved and probably exceeded. This follows the latest survey by the Council, the Australian Woolgrowers' Council, and the Federal Government's Bureau of Agricultural Economics.

Increased offerings of U.K. government stockpile wools—now in course of gradual liquidation at auction—will be made at the London sales to be held in July, September and October next, states the British Wool Federation. Stockpile wool to be offered at the London sales opening on May 9th will be about 10,000 bales, but in the three succeeding sales series the quantity will be about 16,000 bales per series. It is understood that these increases do not involve any addition to the agreed annual quantities of stockpile wool offered at U.K. auctions, but are re-arrangements within an unchanged annual total.

To remove the long intervals of four to six weeks between wool auction sales, a new wool selling method will operate in Western Australia during the 1960-61 season. Weekly sales will be held in Freemantle

The 'New Bradford' SYSTEM

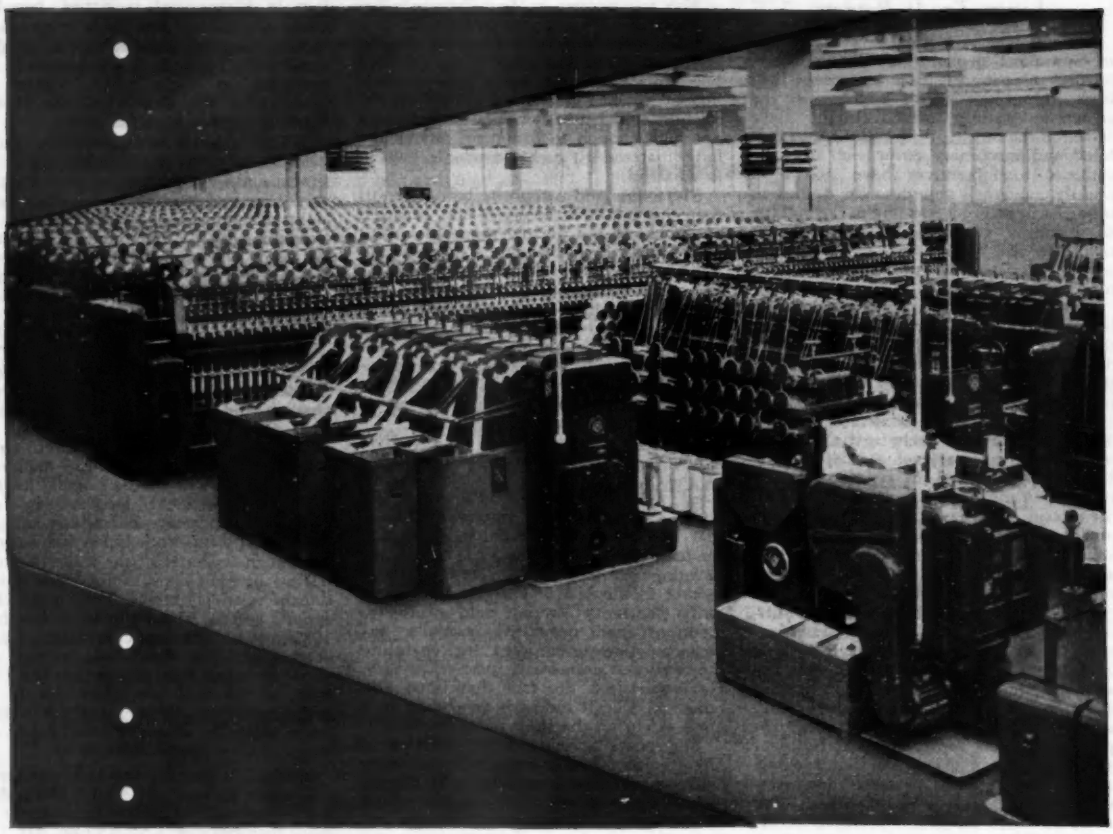


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Illustration shows a full-scale installation by courtesy of Messrs. Fielding & Johnson Ltd., Leicester.

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Jute Fibre, Yarn and Cloth

In Pakistan, raw jute markets became firmer at the beginning of April. E.P.C. values, rapidly advanced, are in some instances now £27 per ton above minimum price levels. Progress reports of the new crop indicate that lack of rain held up sowings, which could mean a later harvest and possible shortages of fibre before the next crop became available. Buying by Continental countries and Poland, Czechoslovakia and China absorbed large quantities of raw material and Indian mills had been granted licences to import 300,000 bales of cuttings and 100,000 bales of long jute from Pakistan during July/Dec. Spinners began to show interest as they realised supplies had to be obtained before fibre from the next crop would become available. Prices of lower grades advanced quickly and shippers were not keen sellers. Some very high prices were paid in Pakistan in inter-baler business. Although Dundee spinners were reluctant to follow the rise in values, a fair amount of movement took place. All spot and afloat parcels were quickly taken up and there is now very little near-at-hand material available.

Prices may remain at a fairly high level because of this extra demand for raw material from Indian mills. The next crop is expected to be approximately the same size and it is possible that a period of higher prices can be expected.

Mill Firsts were raised to £116, Mill Lightnings to £108, Mill Hearts to £104 and grade Hearts to £94, c.i.f. U.K.. for Apr./May shipment; many shippers were asking considerably more and the market was irregular. Lower grades of dark jute showed a substantial price rise with grade Tossa-2/3 at £115 and grade Tossa-4 at £107. Continental Tossa-2/3 was at £104 and crack Daisee-2/3 at £106 Apr./May. A few offers of new crop jute indicated prices like £100 for Mill Lightnings and £90 for Mill Hearts for Aug./Sept. shipment. So far this has not attracted spinners as business was done some time ago at well below these levels. Spinners in Dundee still hold fair stocks of raw material but it is felt that further supplies will have to be obtained before new crop is available.

Prices of raw jute have remained at realistic levels for some time but the present rise will make it difficult for spinners and manufacturers to compete against other materials. During the past few months there has been evidence of jute recapturing ground lost to paper but with the present much dearer raw material market these opportunities may again be lost. With an expanding world economy it is necessary for Pakistan to grow a crop of jute which will supply world demands at a price level which will allow spinners and manufacturers to compete with other commodities. Pakistan and India have signed a "most favoured nation" trade agreement providing for mutual treatment in the commercial sphere. This provides for Pakistan supplving India with raw material for her jute mills and this extra demand can very easily mean much higher prices to users of raw jute throughout the world.

The Calcutta goods market has become much dearer and prices of hessians and sackings have advanced to high levels. Extra demand has been shown by far Eastern countries such as China for goods. Indian Jute Mills Association have decided to permit members to unseal an additional 1% of their silent looms with effect from May 1 and a further 1½% from June 1. This decision was taken provided the industry is satisfied as to the adequacy of supplies of raw material. The Government of India has advised the Association that so far as lies within its power, it will ensure adequate supplies of raw jute to the industry from local sources and by way of imports. As a result of this, prices of Indian-made goods have risen in sympathy with raw jute and quotations are now at 67s. 6d. for 10 oz. 40 in., and at 51s. 3d. for 7½ oz. per 100 yds., f.o.b. Calcutta for April shipment and at 67s. 6d. and 51s. May. "B" twills were at 187s. April and 185s. 9d. May.

Stocks of goods held by Indian mills at the end of March were 900 tons higher in the case of hessians but 2,500 tons lower for sackings compared with the previous month.

Dundee is busy and most producers are fully employed for some time ahead. Due to rising prices, consumers have been placing contracts for forward delivery. The carpet trade in particular have covered their needs well forward and yarns of this type are not now easy to obtain. Demand for wide cloths for the tufted carpet trade is very good and some expansion in this material is taking place.

Steady Demand for Cotton Goods

Business in yarns and cloths since Easter has been rather easier but the off-take in every direction is still extremely good compared with the same period a year ago. The Budget has had little or no effect on trading conditions and the re-organisation scheme is slowly sorting itself out. Some firms with large quantities of equipment—which at the outset of the schème seemed certain of sales—now find that many things have become a drug on the market. Items such as yarn balances, wrap-reels, examining boards and drums, strength testers, etc., also thousands of rings for spinning and doubling frames, bobbins by the million, card clothing, belting ropes and banding of all types seem impossible to dispose of. It is strange to reflect that it is only, relatively, a few years since it was extremely difficult to buy wooden bobbins. The wheel has now turned full cycle and what a depressing experience it is.

Most qualities and counts of yarn have been in request. Many manufacturers are still apprehensive of future supply arrangements and spinners' order books are still full to capacity for some considerable time ahead. Export orders are slightly better at the moment with a little more interest in one or two Continental markets. The bulk of the business put through has been on home trade account, the greatest volume being standard weaving qualities in twist, weft and doubling wefts. Medium counts have sold well and sales of mule spun fine counts are much better now than for a long time. Coarse numbers and condenser yarns are assured of ready buyers. Blended staple yarns—rayon/cotton, nylon/cotton, "Terylene"/cotton and 100% man-made staples are in good request and fancy folded and novelty effect yarns are eagerly sought. Hosiery yarns of all types are selling well and less is heard these days of trivial complaints, and threats of cancellations and compensation. Price movements in certain types of staples have led to some spinners increasing their quotations and a few firms are not at all anxious to commit themselves any further than the next few months.

Manufacturers in general are extremely busy on two accounts (*a*) far more market interest and (*b*) far less looms to swallow-up the available business. Inquiry and definite bookings have covered every type of dress fabric in all fibres and mixtures. In woven cloths, new approaches in dobby and jacquard design constructions have found favour and traditional prints in bright, new colours have found immediate markets. Furnishing fabrics continue to sell well with, perhaps, rather more interest in contemporary designs. A Continental atmosphere is clearly portrayed in many designs and in many cases the colourings now available are more lively and attractive than they have ever been. British designers have undoubtedly accepted the challenge of the times and have responded magnificently in many spheres of industry and commerce. Household specialities are in keen request and practically every type of medium and top quality towellings are in demand. Cheap roller towelling is hard to sell but bath mats and glass cloths find immediate support. Cotton blankets in attractive pastel shades and tartan-type patterns are not moving as fast as expected and cotton and rayon quilts need fresh impetus. One new novelty—a terry-type bedspread is in exceptionally heavy request but the supply at present is limited in that only one or two firms are making it. Industrial cloths are being sought and some good business can be had in these specialities.

Silk and Man-Made Fibres

Business shows no signs of slackening at present, and it is believed the demand will continue at the same high level for some time well in the future. Current demand for silk and acetate fabrics continues and makers'-up and wholesale houses are steadily replenishing stocks of all types of dress fabrics. In furnishing fabrics also, rayon is more than holding its own in the wide range of new constructions in traditional and contemporary cloths. Cotton and "Terylene" mixtures are going well in tunic, dress and sports shirtings, also blends of nylon and acetate rayon for other shirting cloths.

Yorkshire spinners and manufacturers tend to increase their consumption and production of blended yarns and cloths in which nylon and "Terylene" play increasingly important parts. The off-take of rayon for woollen and worsted-type blended cloths is also increasingly high. For the ladies' trade all-"Terylene" fabrics for pleated dresses are in keen request and for suiting cloths blends of wool and "Terylene" are being employed in an increasingly attractive range of designs and colourings.

Leek and Macclesfield areas dyeing sections report better activity than last month but the position is still adversely affected by the re-organisation in the cotton industry and order books are correspondingly shorter. Printing firms are busy enough although order books in this section have shortened slightly in recent weeks.

Knitting sections of the industry are glad to see orders for autumn deliveries well in hand and current demand is certainly better than that of last year.

Smallware sections report reasonable activity and the variety of products continues to increase steadily with the widening range of production of fancy braids giving way to some extent to a range of industrial braids. Business in general in the Midlands is quite good at present in most sections, despite the competition from Continental sources.

BOUCHER MACHINERY for the CARPET INDUSTRY

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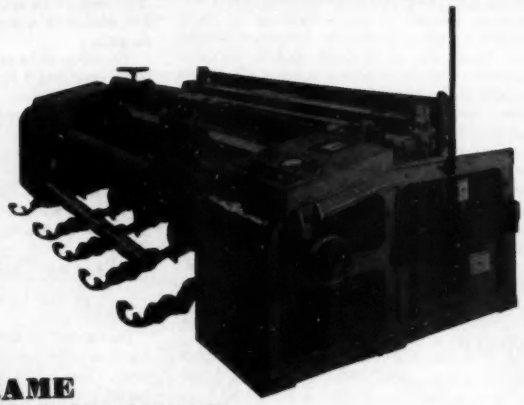
Lockhead Hydraulics enable constant pressure to be applied to beam rollers, from nothing to 1,000 lbs. per square inch, each side controlled independently. Constant Peripheral Beaming Speed throughout entire range of beam, from 6" diam. barrel to 36" diam. flange, at three different speeds. Totally enclosed oil immersed Constant Speed H-Gear Unit. Warp Length guaranteed. Machine automatically cuts out at any pre-set yardage for any number of beams, until re-set.



Tube frame threaded with the spool in its spring holders: eliminates four operations (patents pending). Needles are brought forward by simple foot operated switch, leaving operatives' hands free to attend to interrupted ends and return to thread by the same operation. Tube frames can be threaded as fast as removed from the chain, thus facilitating immediate return to their last position in the chain. All needles have rounded crochet hook ends, preventing yarn damage and enabling smoother threading. All spool end strive difficulties overcome enabling, 100% threading even if strive is as much as 1" by our new full length comb. By fitting side supports the standard 4/4 machine can thread 2/4 to 16/4 Tube frames, or a machine can be supplied 12/4 in width. Tube Frame automatically clamped eliminating still a further hand operation.

TUBE FRAME THREADING MACHINE

"CONSOLE" HIGH SPEED CARD CUTTER

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Notes and News

Production of Man-Made Fibres

Output of man-made fibres was at near record levels in February according to the British Man-Made Fibres Federation. Total production at 50·28 million lbs. compared with 50·80 million lbs. in January and only 40·22 million lbs. in February last year. Production of continuous filament yarns at 22·24 million lbs. compared with 21·79 million lbs. in January and 17·84 million lbs. in February last year, and was the third highest total ever, comparing with 22·87 million lbs. in December 1959 and 22·98 million lbs. in the record month of May 1957, both of which were longer months. Production of staple totalled 28·04 million lbs. in February, compared with 29·01 million lbs. in the record month of January, and indicated that the daily rate of production was fully maintained. The corresponding figure for February 1959 was 22·38 million lbs. In the first two months of the year, total production of man-made fibres was 101·08 million lbs. compared with 86·25 million lbs. in the first two months of 1959, 76·45 million lbs. in the first two months of 1958 and 83·68 million lbs. in the first two months of 1957.

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Carbon Dioxide Protection in Carding

An article published recently in No. 4 of the new series "Fire Protection Bulletin" gives details of a fixed carbon dioxide installation designed to give individual fire protection to a card. Although the risk of fire occurring in cards is relatively small compared with the risk associated with opening and cleaning machinery, fires do break out and can cause considerable damage unless quickly extinguished. The primary advantage of the CO_2 system is its complete elimination of water damage, a feature of considerable economic significance when considering the cost of re-clothing a water-damaged card.

The individual installations are arranged so that the gas emitted from discharge horns, carefully positioned over the machines, completely covers the cylinders and the hopper feed where fires so often start. In addition low velocity horns are positioned at points around the machines at floor level to prevent the spread of fire in "fly" which tends to collect there. The system is usually operated by manual controls. Automatic operation by glass-sealed electrical detectors or fusible links positioned over the machine can also be fitted. The discharge horns for each set of machines are fed by pipework from a manifold connected to a battery of cylinders. As with other similar installations an audible warning can be fitted and can if required be connected to a central indicator panel.

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Gas at Work in Industry

Speaking at the inaugural luncheon preceding the opening of the recent exhibition in Harrogate Sir Henry Jones (chairman, Gas Council) referred to the impressive development work done by the industrial research department of the two Boards, in collaboration with manufacturers. In particular, he mentioned the applications of furnaceless heating developed by the North Eastern Gas Board, one of which could be used for the stress relieving of such large items as boiler shells and cast steel rollers used in the steel industry. Sir Henry believed that as the demand grew for fuels well adapted to modern industrial processes, the use of gas in industry would increase more rapidly than in the past. He mentioned the scientific work done by the Gas Council and pointed out that all the Area Gas Boards had teams of experts capable of advising industrialists who wanted to know the best way of providing heat for their processes. He went on to criticise the many local authorities in Yorkshire which were not giving gas a chance to compete fairly with other fuels. He said that for 150 years the gas industry had produced gas, mainly on the basis of carbonising coal. The industry wished to keep the gas supply system of the country with big central works based upon coal, which he hoped would be cheap enough. "If not," he said, "other materials will be used—we shall keep the industry as modern as it is today. We are working as a team to keep costs down." He pointed out that the cost of carbonising coal had nearly doubled in the last ten years and the market for coke had been affected by competition from oil. Gas in the future will be made from low-grade coal which can be bought more cheaply, from oil and refinery gases, and perhaps from liquid methane. He concluded by stressing that the future would be met by policies based on new systems of gas manufacture and even better service to consumers.

Shoe Trade Threads

A wide range of "Terylene" sewing threads for the shoe trade were featured by I.C.I. Fibres Division at the recent Shoe Trades Fair in Leicester. Threads for all stages of manufacture—upper closing, welt sewing, sole stitching and hand sewing—were shown. Threads made from "Terylene" filament yarn are extremely strong and have great flex and abrasion resistance and are quite immune to the rotting action of bacteria. Threads made from 100% "Terylene" filament yarn are now being used for upper closing in men's, women's and children's shoes and for sole and upper stitching in protective footwear and sports footwear.

A special range known as core spun or blended threads in which the "Terylene" filament core is covered by an outer wrapping of cotton has recently been introduced. These threads are said to sew as easily as cotton and have the same excellent abrasion resistance, strength and elasticity as 100% "Terylene" yarns. The tendency of "Terylene" threads to fuse when being stitched at high speeds is also considerably reduced, since the cotton covering affords protection from the heat of the needle.

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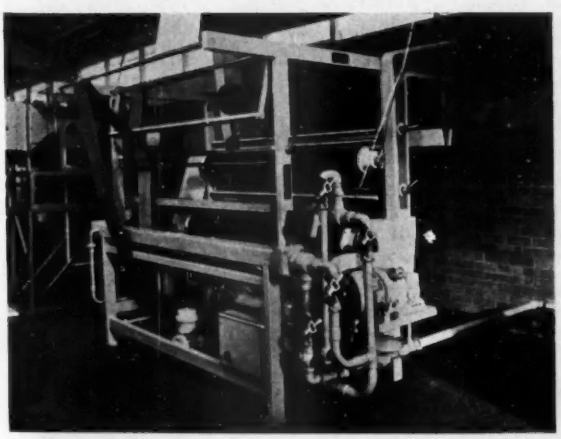
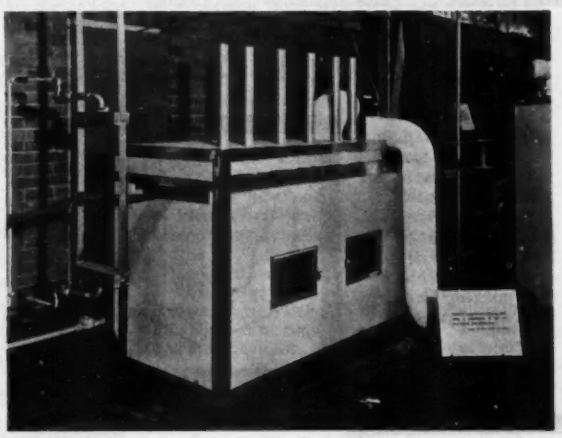


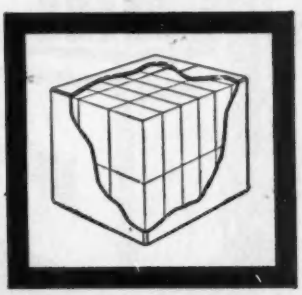
Wool singeing machine shown in textile section (Jas. Bailey (Engineers) Ltd.



Model of a gas-heated tentering oven using a combination of hot air re-circulation and radiant heat. Designed by the N.E. Gas Board

QUALITY IN STORE

First produced fifty years ago, but as modern as modern methods can make them, "Fiberite" Cases show that only by attention to detail can fibreboard packing become "Fiberite" packing.



Your goods have arrived. And thanks to "Fiberite" Cases they have arrived factory fresh. Whether in city supermarket or village store, this is the end of the line. Now your goods see the light—on the shelves, in the window.

The busy retailer appreciates the value of tough and sturdy packaging in ensuring safe delivery of the goods he sells. The reputation of any manufacturer rests secure at a time like this when the quality of the goods is matched by the quality of the packing. No wonder "FIBERITE" Cases carry such a tremendous volume of products that are household names!

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The words "Thames Board" and "Fiberite" are registered trade names:

Jute Sales Enterprise

The merchant's part in finding new uses for jute products was stressed by Mr. A. S. Kyle, chairman, at the recent annual meeting of Dundee Jute and Linen Goods Merchants' Association. Mr. Kyle said that merchanting, which was the "father of the jute trade," had the resource today to find new markets to replace old ones which might be lost through changing conditions.

Demand for most jute products, he said, was being well maintained in the general atmosphere of an expanding economy. This gave rise for confidence in the future but only if more stable conditions prevailed in the raw jute market. Mr. Kyle was reappointed chairman. The new vice-chairman is Mr. V. S. Lowden (Low and Bonar Ltd.).

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New Nylon Venture

Algemene Kunstzijde Unie N.V. (A.K.U.) and British Enka Ltd. announce that plans are at an advanced stage for the joint establishment in the U.K. of a factory to produce nylon yarn and nylon plastic materials. The A.K.U. group of companies have already erected nylon 6 manufacturing units in the Netherlands, Germany, U.S.A. and Italy.

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Textile Scholarships

Three scholarships worth in all approximately £1,500 are announced by the Textile Institute. The Institute Cotton Industry War Memorial Trust scholarship is open to young people engaged in cotton weaving in the U.K. The Peter Coats scholarship is open to secondary school boys and girls in their last year who intend to enter the cotton industry; or for those attending a part-time course at a technical college, leading to a full technological or an ordinary national certificate. The Roland Spencer scholarship is for those already engaged in the industry. Full details are available from the general secretary, 10 Blackfriars Street, Manchester 3.

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New Interlining Finish

A new permanent finish for interlinings, the Kirprima P.S. finish—specially designed for use with all crease-resisting and drip-dry garments is announced by Kirkpatrick Brothers Ltd., a branch of Bleachers' Association Ltd.

The increasing use of spin dryers has stimulated the search for an interlining which would have the ability to resist mangling and pressure creasing in the wet state. With such an interlining in collar and cuffs many garments, especially those made of man-made fibre fabrics could be washed and spin-dried, and even wrung out and still show little or no creases when dry. It was also considered that the collar, front and cuffs of a shirt would have an enhanced appearance during wear if the interlining had dry crease resistance as well. Kirprima P.S. has been developed to meet these requirements.

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Tanganyika Cotton Crop

From Dar-es-Salaam, Barclays Bank D.C.O. reports that Tanganyika's 1960 cotton crop may well be in excess of the estimated 220,000 bales. This compares with the 1959 record crop of 183,000 bales.

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Dyehouse Information

The following technical information sheets have recently been issued by I.C.I. Ltd., Dyestuffs Division, Blackley, Manchester:—

No. 541. Procion Dyes: Application to Chlorinated Wool/Cellulosic Fibre Blends.

No. 545. Wool Dyes: An Improved Method of Applying Solochromate Dyes.

No. 548. Printing of Nylon.

No. 549. Printing of Triacetate Rayon and Triacetate/Viscose Rayon Blends.

No. 551. Printing "Terylene" Polyester Fibre.

No. 552. Procion Dyestuffs: Continuous Dyeing of Cellulosic Loose Fibre and Yarns.

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New Appointments

Mr. J. G. Smith, Mr. J. H. Givens and Mr. M. R. Parker have been appointed directors of British Celanese Ltd.

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Change of Address

Ransome and Marles Bearing Co. Ltd. have moved their Leicester area office. The new office and stores are at De Montfort House, 223 Belgrave Gate, Leicester. The telephone numbers are unchanged.

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I.C.I. to Increase "Topane" Production

I.C.I. are stepping up production of "Topane" and "Topane" WS, their brands of ortho-phenylphenol and sodium orthophenylphenate, which are potent disinfectants and preservative agents. These extremely potent disinfectants and agents for the prevention of mould and fungal attack are efficient at economically low concentrations and practically odourless. "Topane" can be applied by solution in organic solvents and in animal and vegetable oils, whilst "Topane" WS, the sodium salt is highly soluble in water. Typical applications are the prevention of rot and sapstain in timber, and mould and rot in building products and textiles, including rope.

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Colour Lamps for Clothing Industry

Philips' Colour 34 fluorescent lamps, of special interest to the clothing industry are to be made more generally available. In wide use on the Continent for a number of years these lamsp have a double coating of phosphor which is said to absorb any residual mercury light from the lamp's discharge and converts it into additional red light. Because of the close similarity of colour rendering between Colour 34 and daylight, it is no longer necessary in retail clothing stores to take garments to the window or outside the shop to judge their appearance. Colour 34 lamps are available in normal ratings from 20 w. 2 ft. to 80 w. 5 ft. All have an earthing strip and a silicone coat for universal operation. No extra charge is made for the double coating.

FASHION FINISHES

Perhaps the best way of assessing the exhibition of Beetle fashion Finishes, held recently in Manchester by B.I.P. Chemicals Ltd., is to compare it with the first exhibition also held in Manchester some eight years ago. Then the number of special finishes were few: a water-repellant finish was a great attraction at that time, and a demonstrator consistently poured a jug of water over a fabric to show its proofed qualities. What a change has taken place in the intervening period. Not only was there a number of such finishes at this latest exhibition, but many other finishes which had not been conceived eight years ago. The exhibits were divided into groups and their finishes: durable mechanical finishes, for instance, were grouped together; interlinings, both woven and non-woven, possessing properties of shrink resistance, resilience, crease recovery and resistance to wet and dry-cleaning and pressing.

A range of easily-applied finishes to nylon fabrics, dress nets, laces, voiles and taffetas, was on view, and ease of handling, especially with lace, was stressed, for the advantage of the maker-up. For furnishing fabrics there were examples of those with shrink resist finishes. The Beetle textile resin used imparted full finish, wash-proof, easy ironing after washing, and obviated the necessity to allow for shrinkage on washing when making-up. Water-repellant finishes with additional properties such as handle, abrasion resistance, which did not disappear on washing, were also displayed, and there was a good range displayed of "minimum iron," "non-iron," "drip-dry," "fashion fresh" finishes on fabrics. Examples were also seen of flame-resistant finishes on nylon net, and the versatility of the finishes demonstrated on 80 × 80 cotton fabric, as well as spun viscose rayon, nylon net and nylon taffeta.

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18" TO 4 YDS.

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★ *High efficiency with proved firm gripper weave.* ✱ *Variable Quality of 4-10 rows per inch.* ✱ *Patent rotary beam for simplified warp Beam replacement.* ★ *Push button all electric control.*

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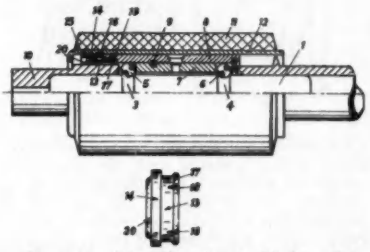
RECENT TEXTILE PATENTS

These abridgements are republished from specifications by permission of the Controller of H.M. Stationery Office. The full specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2. Price 4s. each.

810,645 Sealed Drafting Rollers

SKF KUGELLAGERFABRIKEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, 13 *Ernest Sachs Strasse, Schweinfurt am Main, Germany.*

Describes improved drafting rollers for textile machines. The shaft 1 comprises annular grooves 3 and 4 in which rotate rows of balls 5 and 6. Between the balls is an intermediate member 7 which guides the outer ring 8 which is located by a circlip 9. A journal 10 is forced on to the outer end of the shaft, and the roller body 12, which carries the roller covering 11, is mounted on the outer ring 8. The body 12 is located on the outer ring by means of a

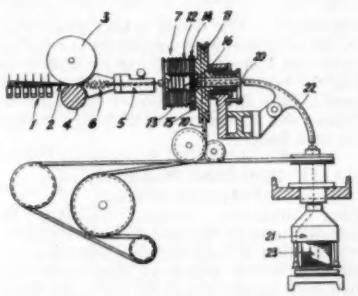


sealing ring 13. The ring is Y-shaped in cross-section and comprises an annular flange 14 near one end which is held in position by circlips 15 and 16. At the opposite end of the sealing ring there is formed a resilient annular bead 17 which has incisions 18 to divide into into segments. When the body 12 is mounted on the outer ring 8 the bead engages in a corresponding recess 19 in the outer ring. The third part 20 of the ring 13 tapers towards the journal 10 with which it is in circular contact. The sealing ring 13 is preferably made of resilient material.

810,654 Improved Gill-Frame for Sisal Spinning

JAMES MACKIE AND SONS LTD., *Albert Foundry, Belfast.*

Describes an improved gill-spinning frame as used for the spinning of yarn from sisal and manila. The frame has a faller bed 1, from which the fibres 2 are drawn by means of rollers 3 and 4. The fibres emerging from the rollers pass directly

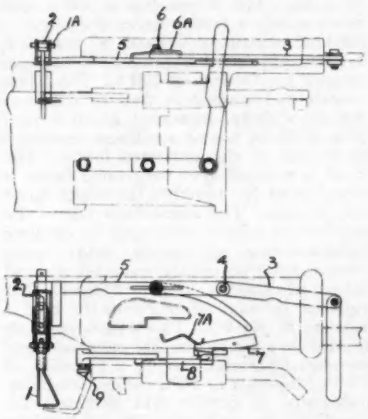


into a smoothing die 5 fitted with a trumpet-shaped conductor 6. The fibres emerging from the die pass to a haul pulley assembly 7. This assembly is driven by a rope 10 passing around a pulley 11 on which are mounted the individual haul pulleys 12 and 13. These are each connected to wheels 14 and 15 meshing with a stationary pinion 16 so that the individual haul pulleys are caused to turn as the complete assembly rotates about the central pinion. The yarn is passed backwards and forwards between the two haul pulleys in the usual way and the assembly thus exerts a pull on the yarn in a horizontal direction. The twist is applied by the rotation of the haul pulley assembly 7 and this twist passes back into the smoothing die, being prevented by the die from passing back further into the drawing rollers. The yarn emerging from the assembly at 20 is thus fully twisted and can then be bent down towards the flyer 21 without difficulty. In passing between the pulley assembly and the flyer, the yarn passes over a conductor surface 22 and is then wound on the bobbin 23 by means of a flyer 21.

810,666 Cop Changing Mechanisms for Looms

THOMAS C. KEAY LTD., *Baltic Street, Dundee, Scotland.*

Describes cop changing mechanisms for looms, particularly to looms incorporating devices for extracting the remaining portions of almost exhausted cops before fresh cops are loaded. 1 denotes a cop



feeler mounted on a pivot 1A and presenting an abutment 2, 3 denotes a lever adapted to be swung about a fixed pivot 4 by the mechanism of the loom, and 5 denotes a floating lever pivoted at 6 to the lever 3. A spring 6A holds lever 5 in a desired portion relative to lever 3 when the mechanism is inoperative. One end of lever 5 is engageable with the abutment 2 and the other end is engageable with a latch 7 urged by spring 7A into the position in which the latch engages, and retains in the inoperative position, a setting lever 8 carrying a stud 9, movable into a position to engage the extracting device mechanism.

811,071 Improved Solid Cop Winding Machines

SCHWEITER A.-G., *Horgen, Switzerland.*

On an automatic winding machine for solid cops having short conical butts, the commencing turns of the new cop may give rise to disturbances when the thread is drawn off from the shuttle. To overcome this disadvantage, the winding spindle possesses a conical nose, and the short conical butt is furnished with a co-operating conical portion, which thrusts against the nose of the winding spindle and is seated firmly on it during the entire winding operation.

811,150 Pile Yarn End Separating Means for Carpet Looms

WILLIAM HILL (KIDDERMINSTER) LTD., *Worcester Road Works, Kidderminster, and* W. HILL.

Improved pile yarn end separating means for spool Axminster carpet looms, incorporates a guide section provided with parallel troughs arranged side by side, each of which accommodates a pile yarn end. A retaining section fits on the guide section for closing the troughs, and springs offer resistance to movement of the pile yarn within the troughs. Means are provided for securing together the guide section and the retaining section as and when required.

811,369 Treating Fabrics with Liquids

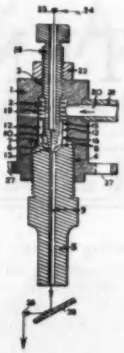
WOLSEY LTD., 31 *King Street, Leicester, and* D. M. YUILL.

A wet treatment process for materials, for example rinsing knitted fabrics in roped or bunched form after a previous wet treatment, comprises lifting the fabric past a series of vertically spaced squeezing devices, and flowing a liquid downward in contact with the fabric as it passes each squeezing device below the liquid inlet. The speed of lift of the fabric and the volume of falling liquid supplied to the squeezing devices are adjusted whereby all the liquid in the fabric, including residual liquid from a previous wet treatment process, if any, is squeezed out of the fabric, the purer falling liquid treating that portion of the fabric which has been partially treated.

811,373 Manufacturing Looped Yarn

N.V. ONDERZOEKINGSINSTITUUT RESEARCH, 76 *Yelperweg, Arnhem, Holland.*

Device for manufacturing looped yarns, has a tubular treatment chamber, which is provided with an axial thread supply inlet at one end, with a thread discharge opening at the other end. A gas supply system debouches sideways of the thread supply inlet, a baffle being mounted near the

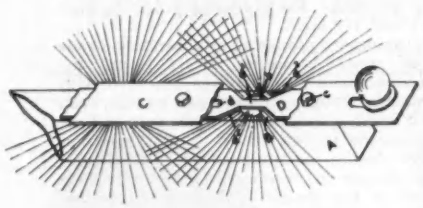


thread discharge opening. The gas supply system comprises one or more channels debouching tangentially in the treatment chamber at the thread supply inlet.

811,377 Spray Units for Washing Machines

F. SMITH AND CO. (WHITWORTH) LTD., *Sunnyside Works, Whitworth, Rochdale.*

Improved spray units for washing machines in which a liquid emerges through an orifice or orifices in a header box. The header box A is closed at the top by a cover B, formed as the upper surface of the box, having one or more orifices *b*. A deflector plate C of greater width than the top of the header box is bolted to deflect the spray of liquid emerging from



the orifices horizontally. Between the cover and the deflector plate is mounted a plate D formed with slots *d* capable of sliding along the box on the bolts *c* for the deflector plate. The plate D is formed with portions of reduced width d^2 above each orifice in the box to provide cut away fan shaped portions d^1 to allow the liquid to emerge from the orifice and impinge on the underside of the deflector plate. The plate is mounted to slide within predetermined limits, whereby any foreign matter in an orifice may be cleared whilst the spray is in operation.

811,702 Dyeing Wool or Hair Materials

H. HARRISON AND CO. LTD., *Finishers Repton Mills, Repton Street, Leicester, and* D. MOORE.

A process of pattern dyeing in which the wool or hair to be dyed is subjected to selective irradiation with ultra violet light in accordance with a desired patterning effect before subjecting the material to dyeing. The effect of the irradiation is to modify the affinity of chosen parts of the material for the dye, and thus when the material is subjected to dyeing those parts which have been treated with ultra violet light are dyed to a different depth of colour than parts not subjected to such light. The irradiation treatment greatly simplifies the procedure of pattern dyeing and renders possible a choice of a much greater range of patterning effects than would otherwise be obtainable. The treatment is particularly effective on fibres of wool or hair such as are made up into fabrics. In one example, a previously scoured white wool knitted sample weighing 20 grammes was placed on a turn-table capable of revolving slowly and immediately on top of the sample was placed a perforated metal sheet. With a high pressure mercury vapour quartz tube located at a distance of about 6" from the sample and patterning device, the lamp was allowed to warm up and reach peak emission, and after the turn-table was set in motion the rays from the lamp were then caused to impinge on the patterning device and sample, irradiation being continued for 4 mins. After this period the lamp was switched off and the sample removed and dyed in a bath of 750 c.c.s. of water containing 0·25 gms. of Wool Blue R.L., 0·75 gms. ammonium sulphate and 1·25 gms. glaubers salt. The dye bath was brought to the boil in 30 mins. and boiled for a further 30 mins. It was observed that the portions of the sample that were exposed to the rays had a considerably darker shade than the masked areas, giving a pleasing "polka dot" design of dark blue on a pale blue background.

811,735 Finishing Process for Nylon, etc.

I.C.I. LTD., *Imperial Chemical House, Millbank, London, S.W.*1.

A process for finishing polyamide materials which comprises applying a solution containing the ammonium salt of an acrylic acid polymer, a polyhydric alcohol, and optionally an acid catalyst, and then heating the material at 150°C. or above. In one example, 100 parts of 2-oz. nylon twill fabric is passed through a solution containing the ammonium salt of 4.5 parts of an acrylic acid polymer and 1·5 parts of glycerol in 94 parts of water at 20°C. The fabric is squeezed until the amount of solution retained is 76% of the dry weight of the fabric, and then dried at 50°C. and baked in an oven at 150°C. for 30 mins. The fabric has a stiff, crisp finish which is retained after washing in a solution containing 5 parts of soap and 2 parts of soda ash per 1,000 parts of solution for 15 mins. at 100°C. The fabric treated and washed is found to have a flexural rigidity, measured at 20°C. and 55% R.H. by use of a stiffness tester 4·5 times that of the untreated fabric. The finish is retained after the treated fabric is dry-cleaned by tumbling in white spirit for 15 mins. The ammonium salt of the acrylic acid polymer was made by catalytic polymerisation of acrylic acid (using ammonium persulphate as catalyst) and subsequent addition of sufficient 27% aqueous solution of ammonia to give a solution of pH 7·5. This ammonium salt formed a solution in 2N aqueous ammonium hydroxide having a viscosity of 15·5 centipoises at 20°C. when 50 grams (calculated as acrylic acid polymer) are dissolved in sufficient 2N ammonium hydroxide to give a total volume of 1 litre.

812,000 Screen Printing

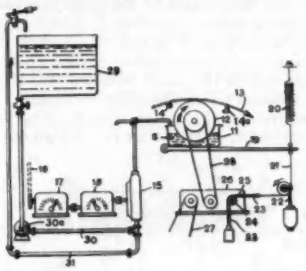
W. WEISHAUPL, *Münchner Modedruck Weishäupl and Co. K.G., Würmstrasse* 10, *München-Grafelfing, Germany.*

A method of printing designs on lengths of fabric comprises intermittently advancing the material over an evenly upward and subsequently downward inclined support serving as a printing table, applying colour to stencils located above the support, and distributing the colour over the stencils by means of doctors. The doctors are moved to and fro across the surface of the stencils during the stationary periods of the fabric.

812,013 Back Filling Carpets, etc.

BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, *Shirley Institute, Didsbury, Manchester.*

A method of carrying out the back filling of a continuous length of carpet or the like, in which the rate of application of starch can be continuously and automatically controlled. The substance is supplied to a reservoir from which it is applied in liquid form to the moving sheet of material by a furnishing roller. The substance is supplied to the reservoir at

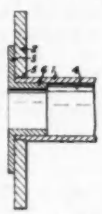


a rate predetermined by the speed of movement of the material and the prescribed weight of substance per unit length to be applied. Any change in the amount of liquid taken up from the reservoir which results from a deviation of the application of the substance from the prescribed rate of application, is utilised to alter the relationship between the moving material and the furnishing roller so as to correct the deviation.

812,088 Improved Warp Beams

FLETCHER BROTHERS ENGINEERS, *Kensington Works, Ilkeston, Nottingham.*

Improved warp beams, particularly, for use with warp knitting machines. A member 1 formed of a tube having a central bore is provided with end flanges 2 which are screwed on to it by co-operating screw threads 5, and to secure firmly the



end flanges. The flange is also screwed to the member and is prevented from rotation by a plug 3 having a stub part 6 extending into the bore of the member. The plug is forced into the bore under pressure to deform the threads 5 and to secure firmly the end flanges.

812,111 Improved Dyeability of Polyester Fibres

VEB CHEMISCHE FABRIK GRÜNAU, 35 *Regattastrasse, Berlin-Grünau, Germany.*

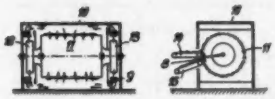
A method of increasing the dyeability of linear aromatic polyester fibres towards dispersed acetate dyestuffs, which the fibre

is treated at temperatures of 80° to 100°C. with condensation products of cyclohexanone or its alkyl nuclear substituted derivatives with a mono- or di-ethanolamine. In one example, 10 g. of polyethylene terephthalate flock are heated in 250 c.c. of a 20% by weight solution of N - cyclo hexylidene-hydroxyethylamine for half an hour at about 90°C. The flock is well rinsed out with water, the water is removed by squeezing out or centrifuging, and the flock is then dried at 60° to 70°C. in the drying cupboard.

812,018 Drum Sieve Dryers for Loose Fibres

FLEISSNER AND SOHN MASCHINENFABRIK, *Egelsbach, Kreis Offenbach, Main, Germany.*

Improvement in willow or drum sieve driers for drying loose fibres. An outer housing 10 completely encloses a sieve drum 11 of a single-drum drier which is provided at both ends with suction fans 12 and 13 for circulating an air current within the housing, passing the same over heating coils 9, thence through the drum 11, and then withdrawing the current in the direc-



tion from the drum. By providing fans at each end of the drum, the suction from the inside of the drum will be so strong that even a heavy fibre bat which is passed towards and away from the drum by a pair of conveyor belts 14 and 15 will be held evenly and securely attached to the outside of almost the entire wall of the drum, during the conveying movement. The small area on the drum which is not covered by the bat is covered on the inside by a cover plate 8.

712,227 Dyeing and Printing of Acrylonitrile Polymers

FARBENFABRIKEN BAYER AKTIENGESELLSCHAFT, 22*c* *Leverkusen-Bayerwerk, Leverkusen, Germany.*

A process for dyeing and printing materials of polymers of acrylonitrile.

In one example, 20 grams of the hydrochloride of 1-amino-5-hydroxynaphthalene, and 31 grams of the hydrochloride of 4 - nitroso - 3 - hydroxy-1-dimethylaminobenzene in 100 grams of glacial acetic acid and 20 grams of water are refluxed for 2 hrs. The contents of the flask are then poured into 300 grams of ice water, and the oxazine dyestuff thus obtained is salted out with a 20% by weight solution of common salt. Polyacrylonitrile fibres are dyed using a liquor-to-goods ratio of 50:1 with addition to the bath of 3% of 30% acetic acid and 1·5% sodium acetate. The fibre is introduced into the dyebath at 40°C., the temperature of the bath raised to 100°C. within a half hour, and the dyeing effected at boiling temperature for 1 hr. Bluish-green dyeings are obtained of good fastness properties, especially of very good fastness to light.

812,264 Machine for Spinning, Twisting or Doubling

PRINCE-SMITH AND STELLS LTD., *Burlington Shed, Keighley.*

A twisting machine comprises twisting machine units, of which each comprises stock-feeding means, and a hollow spindle to receive coaxially at one of its ends the outer member of an extensible package support comprising nested coaxial inner and outer members. An axially movable plunger enters the bore of the hollow spindle to abut the inner member of the extensible package support. An electric motor has its rotor coaxial with and in rotary driving connection with the spindle. Means are provided for retracting the hollow spindles of the several machine units away from the stock-feeding means through a predetermined distance, and during this retraction the plungers are retracted through a smaller distance away from the stock-feeding means, so that the package supports are extended during the retraction of the spindles.

812,280 Slasher Beam Changer

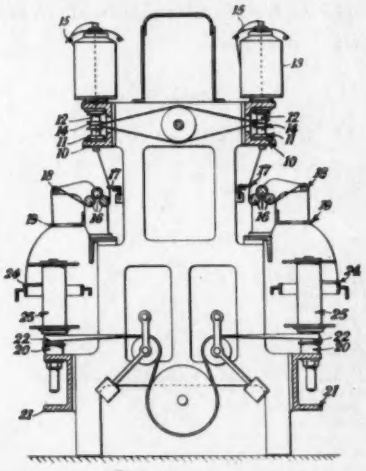
UNISTEL TEXTILE MACHINE CORPORATION, 225 *Westchester Avenue, Port Chester, New York.*

A slasher beam-changer and winding mechanism has a base member with a movable frame on the base having head stocks one on end and complementary tail stocks on the other end. Each complementary pair is adapted to accommodate a replaceable loom beam. Means are provided for driving each of the head stocks through clutch mechanisms with means for revolving the frame to change the relative positions of the beams. At least one of the beams is continuously rotated during the change of relative positions of the beams; and means are provided for continuously maintaining yarn tension during the uninterrupted delivery of warp yarns to the beam changer and winding mechanism.

812,283 Improved Twisting Machines

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

An improved twisting machine, suitable for the production of cabled yarns, with a high rate of output. The frame incorporates at each side a beam 10 which is provided throughout its length with bearings 11 for spindles 12 to carry the delivery packages 13. Each spindle 12 is provided with a wharve 14 and at the top is furnished with a flyer 15. Beneath each adjacent pair of spindles is an assembly of three rollers 16 rotating in contact, thread-guides are provided at 17 and 18 and 19 is a lappet-eye. Beneath each assembly of rollers is a ring-twisting unit, comprising a spindle 20 mounted on a stationary spindle rail 21 and

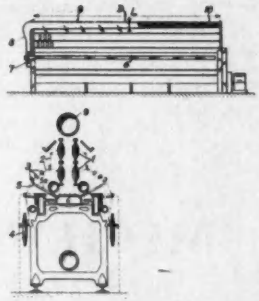


driven by a tape arrangement co-operating with a wharve 22. The separate yarns are drawn upward from the rotating packages 13 and directed by flyers 15 to the spindles through the hollow bores of which they pass downward. On emerging, the yarns of an adjacent pair of packages are brought together at guide 17 and passed between the rollers 16 the speed of which is adjusted to maintain an appropriate tension. From the rollers, the combined pair of yarns pass over the rail 18 and downward through the lappet-eye 19 to the traveller 24, being twisted together in cable form as they are wound upon bobbin 25. The arrangement whereby the yarns are drawn through the hollow bores of the spindles assists in preventing snarling.

812,579 Pneumatic Broken End Collectors

SULZER FRERES, SOCIETE ANONYME, *Winterthur, Switzerland.*

Relates to suction systems in spinning machines, having nozzles communicating with a suction fan and adapted to suck away broken threads and fly. Rovings 2 drawn off bobbins 1 pass through drawing mechanism 3 and are then spun and wound on spindles 4. In the region where each thread leaves the rollers there is a suction nozzle 5 on the end of a pipe 5*a* which opens into a central collecting passage 6, which communicates with the inlet of a fan 7. When the fan is in operation, air is



sucked in through all the suction nozzles and this air flows through the pipes and the passage into the fan. The air stream leaving the fan passes through a pipe 8 into one end of a hose-like duct 9 extending along the length of the machine. The duct has a porous wall which, at least on the inside, is smooth so that the fly, etc., will not adhere to it. The air stream is introduced at such high velocity that the material is transported into the part 10 of the duct remote from the fan. The air to be returned into the room passes out through the pores of the duct into the room. The length L of the cut is about eighty times its mean diameter D. The ratio $\frac{L}{D}$ is preferably at least 40.

813,439 Making Tufted Carpets

DAVID CRABTREE AND SON LTD., *Hope Ironworks, Laisterdyke, Bradford.*

A method of making tufted carpets which comprises, for each tuft, introducing a loop of cotton through a backing fabric, inserting an end of a length of tufting material through the loop, and withdrawing the loop to tighten it, so that it draws the length of tufting material into close contact with and anchors it to the backing fabric.

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